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[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

The Annual Meeting of the Association will be held at Young's Hotel, Boston, on the 16th, 17th and 18th days of February next, commencing at 11 o'clock on Wednesday morning, Feb. 16th.

Members intending to propose to the Association the names of applicants for membership are requested to send them to the Secretary at least one day before the meeting. The Directors will meet, at the same place, on the evening of February 15th, at eight o'clock. Papers to be read should be forwarded to the Secretary in season to be presented by him to the Directors, at that meeting, for their approval.

GEO. B. NEAL,
Secretary.

BOSTON, Jan. 10, 1881.

ILLUMINATION BY ELECTRICITY IN NEW YORK CITY.

For the past six or eight weeks there has been quite an extensive demonstration going on in this city as to the results obtainable, in a practical way, with electric lights for thoroughfares.

Upon each block, at one of the street corners, posts of iron about thirty feet high, were erected from 14th to 34th streets, on Broadway, upon which electric lamps were placed; and in the open space in front of the Fifth avenue Hotel a lamp was placed on the top of the two candelabra gas posts which are placed there. The electricity is generated in 26th street, between Sixth and Seventh avenues. A complete circuit of large insulated wire is made from the source of supply through the different lamps, the wires being carried upon the posts of the city's fire alarm system. Other wires are also used to supply private consumers.

It is said that wires are also to be suspended from the elevated railroad structure to reach some points where the light is desired. The total number supplied at the present time from this source is said to be about eighty, of which twenty-three or twenty-four are especially street lights. All of these street lights are furnished, thus far, to the city free of cost, so that a direct statement of cost, as compared with gas, cannot be arrived at as yet.

Of course the company supplying the light will be able to arrive at a tolerably accurate estimate of the running expenses after so long a practical experiment. The number of gas lamps which have been in use on that part of Broadway where the electric lights are located is about seventy-five. These cost the city $15 per annum, including cleaning, lighting, painting, etc., which would make a total annual cost of $1125.

Where the electric lights are supplied to "private consumers" the charge is one dollar per lamp per night up to 12 o'clock. The street lamps burn all night; but if it be assumed that the company would be willing to furnish the light to the city for all night at the same price as they supply private consumers up to midnight, viz., one dollar per lamp per night, the cost of lighting the one mile of Broadway by electricity would be, for twenty-three lamps, $8395. Of course, this is "supposing a case," and, in the absence of actual data, is only given as a supposable case. As to the character of the light it has been very aptly described by a French wriler as "illumination but not lighting." It is true that there is much more light in some places than by the gas system; but the object of street lighting is to light the roadways and sidewalks, and for this purpose all the light that is sent off in the upper air is wasted.

Around each of the posts of the electric lights there is a very dark shadow for a space of twenty feet radius. There is more or less unsteadiness to the light of necessity although those above referred to are the steadiest we have ever seen when taken on the average. The average candle power of these electric lights, so far as can be judged from casual observation, will probably not exceed 250 candles; but in this judgment we may be in error, and no doubt, at times, the candle power is higher than that, but, on the other hand, there are times when it is less. There have been but few extinctions, and during the recent heavy sleet storms, the comparatively limited extent of wire enabled the company to so watch and attend to their lines as not to have an interruption when the hour of lighting arrived. In one or two instances this is said to have been done by cutting the wires during the worst of the storm, which was in the daytime, and thus relieving them from the strain of the heavy weight of ice, which demolished the various telegraph

wires in the city to such an extent that, for twelve hours, communication was entirely cut off both with the outside and inside world by telegraph and telephone.

Whether such a remedy would be possible were the lines extended to the lighting of the entire city is exceedingly problematical. It does not appear that there is any likelihood of competition in price between the two systems; and if the city is ready to pay for more light than it has had, there seems but little doubt but that a better lighting can be furnished by a judicious use of gas for the same amount of money than by any other system.

Suffocated in Bed.

DEATH OF TWO YOUNG GIRLS FROM INHALING ILLUMINATING GAS.

The necessity of carefulness in turning off gas, which has frequently been shown in a tragic way, was again illustrated yesterday morning by the suffocation of two young women. Henrietta Braundofer and Barbara Weiss were found dead in their bed at No. 599 Third avenue, where they were employed in the restaurant of Mr. Fritz Henrich. The former, who was 17 years of age, was a native of the city, and left her parents' house at No. 224 East Fifty-sixth street two years ago to take service in the family where a sister of hers had been engaged before. Barbara was 19 years of age and had less than two years since come to this country from Germany with an aunt. They slept in a hall bedroom on the third floor. About ten o'clock on Friday night the two young women retired. There were two gas jets in the room and probably both had been turned on in the darkness and only one had been lighted. That at least seems the readiest explanation of what occurred in the room during the night. Next to it and communicating with it by a door, which was slightly ajar, is a large apartment in which Mrs. Hendrich, the proprietor's mother, and a little child used to sleep, and the former was awakened yesterday morning by a strange sense of oppression to find that her room was filled with a light vapor and that a heavy odor of gas pervaded it. The old lady roused herself at once and, fearful lest some accident had occurred, she ran out upon the landing and called for assistance. Mr. Henrich's wife answered her, and when she heard what occasioned the other's fright she hastily joined her. A suffocating smell of gas was filling the house, and Mrs. Henrich as she turned into the room to carry out the child who had been left in it was almost stifled. She returned, though, and flung up the windows to give the offensive odor a chance to escape, and then for the first time thought of the girls in the bedroom.

The door opening into it was first unclosed, and as the lady swung it open to arouse the sleepers a strong current of gas swept out from it. No answer was given to her summons, and on looking in, a fearful sight was presented to her. In the stifling room the two inmates were lying on the bed, where they had fallen asleep, both lifeless. Help was summoned, but too late to be of avail. Barbara, the older girl, lay nearest the wall, her face so calm and composed that she seemed only to have dropped asleep, were it not for the deathly pallor that had settled on it, and a thin red stream that oozed from her nostrils. The younger girl was more fearful to look upon. Death had not stolen upon her quietly and stifled her in her slumbers. She had awakened while suffocating and struggled against it, but had succumbed in an agony that had left eloquent traces. The expression of the face was dreadful. It most resembles that which the victims of strangulation wear. The skin was livid, the eyes were bulging out as though bursting from their sockets, and the protruding tongue was covered with a scaly coating. The services of a physician who was brought at once were of course useless, and then attention was turned to the causes of the girls' horrible death. The examination of the two gas jets explained it. Only one of them was turned off. Doubtless both had been turned on when the inmates of the room entered it, and one had been left unlighted.

The family of Henrietta Braundofer were informed of her hapless end, and a most heartrending scene occurred when they reached the apartments where she lay dead.—New York *Herald*, Feb. 13.

Explosions in Yonkers.

WESTCHESTER GAS HOUSE IN RUINS.

On Monday evening, February 7th, at a quarter past eight o'clock, our residents were thrown into a state of great excitement by a concussion which shook the foundations of the city. Some idea of its force may be formed when we state that persons seated in their parlor on Warburton avenue believed some heavy body had fallen in the chamber above them. The house seemed to tremble, and doors flew open. In other localities articles were knocked from shelves and tables. "It is an earthquake!" said one. "It is the powder house!" said another. "It is glycerine!" exclaimed a third.

It was soon learned that the concussion was caused by an explosion at the works of the Westchester Gas Company, on Nepperhan avenue, north of Ashburton. The fire alarm was sounded, and the entire department started for the gas works at full speed. When the engines arrived the building was a mass of ruins; the front and north walls were entirely blown out, all the others were in an unsafe condition, and the iron roof was twisted in all sorts of shapes. A fresh volume of flame escaping gas from a pipe in the compartment on the north of the gas building lighted up the locality. Four or five streams were directed to the flame—but in vain. The pipe was connected with the holder, and unless something else had been done to prevent it the flame would have continued until the holder was exhausted.

Thomas Burns, who resides near by and who was formerly employed in the works, suggested that the trap in the pipe between the flame and the holder be filled with water so as to cut off the supply of gas to the flame. This was done, the flame was extinguished, and darkness reigned.

The cause of the explosion was directly attributable to an escape of gas through a pipe in which there was a cock, which was supposed to be shut The main building, which was of brick, and two stories in height, was divided into four rooms. The large south one, in which were the retorts for the manufacture of gas, contained a furnace, boiler, superheater and washer, with a hydraulic main running along its north end. On the east side was a new Strong's carburetter, which had only been in use about a week, having been put in to furnish illuminating gas. In the northwest corner of the building was the wash room, in which a gas jet was burning low over the washstand. Adjoining this on the east was the photometric room, in the centre of the building, and adjoining this again on the east, and forming the northeast corner, was the meter room. In a wing, at the north end of the building, was the purifying room. It was in the cellar, under this purifying room, that the gas escaped which caused the explosion. In the centre of this room is what is called the centre-seal, through which all the gas passes before going into the mains for distribution throughout the city. It is divided into four compartments, which have pipes leading from them into the cellar underneath to let off sediment and accumulated impurities that gather in the bottom of the centre-seal. Each of these four pipes has a cock for letting this sediment out. By some unaccountable oversight or accident one of these cocks was left partially open on Monday afternoon, and the gas flowed rapidly into the cellar.

In the building at the time of the explosion were Wm. H. Pearson, Jr., gas maker, who had his hands blistered and face scorched; Andrew Hanson, engineer, and Jere Johnson, night watchman, neither of whom were injured. Pearson's injuries were but slight. He was stepping into the wash room at the time of the explosion, and he supposes that the opening of the door agitated the escaping gas so as to bring it more directly in contact with the gas jet, and thus the whole had ignited and exploded. The crumbling walls came down and the woodwork took fire.

Pearson said he did not know anything from the time he saw the room full of blazing gas, and heard the explosion, till he found himself outside of the building. How he got there he did not exactly know. An examination of the premises proved that the foundation of the building is all of the structure that remains uninjured. Everything in the retort room is intact and ready to furnish gas, but work will be suspended until the walls are rebuilt. The light wooden roof over the purifying room, which flew into the air at the time of the explosion, thus giving vent to the gas, is considered the only thing that saved valuable machinery.

The loss is estimated at $2,000. The building will be immediately rebuilt.

ANOTHER EXPLOSION.

For some time past the people on the same block with the post office have suffered from rank odors of escaping gas. It was particularly offensive in the carpet and furniture store of A. Sahaigan, next to the post office. Last Monday afternoon, about half-past three o'clock, S. S. Crane, an employee, went into the basement to see if he could discover the leak. On entering the closet he found the smell very strong. He lit a match, and just as he got it over the entrance of the soil pipe leading into the sewer, there was an explosion so violent as to blow the cover off the coal hole.

Investigation proves that the Main street sewer is filled with gas. The strong presumption is that it gets there from leaky mains. The representative of each of the four companies exclaims, "It is'nt ours!" But the people are suffering from the nuisance, and are exposed to the pending danger of being blown up.—*Yonkers Statesman.*

NEW GAS COMPANY.—It is understood that the formation of a new gas company has been accomplished, and that Baltimore will be represented in in the board of directors by Messrs. Robert Garrett, William F. Burns, Joshua G. Harvey and probably Colonel Osman Latrobe. The remainder of the board will be composed of New Yorkers, who, it is stated, will furnish a majority of the capital. It is further stated that the presidency has been or will be tendered to a well-known gentleman who was at one time president of one of the old companies absorbed by the Consolidated gas company. As soon as possible, after the filing of articles of incorporation, the work of construction will commence, and the new company expect to be prepared to furnish gas to consumers early next fall.—Baltimore *Sun*, Feb. 5th, 1880.

Report of the Superintendent of Lamps of Boston, Mass.

LAMP DEPARTMENT, Jan. 10, 1881.

To the City Council :—

Gentlemen—The Annual report of this department for the municipal year 1880 is herewith respectfully presented in accordance with the ordinance of the city requiring the same to be presented on or before January 10th of each year.

It contains a table showing in detail the expenses of the past municipal year; a table showing the comparative expenses for fourteen years; a table showing the cost of the present number of lamps at the rate now paid for gas, oil, and lighting, cleaning, and care of the same.

Tables showing the number of lamps on the 15th day of December, each year, for the past fourteen years, and the comparative increase, together with such general information as may be of interest.

During the past year there has been quite an increase in the total number of the public lamps, made necessary by the completion of new streets on the Back Bay, and in answer to numerous petitions from suburban portions of the city.

It is to be expected that the call for additional lamps will be continued, and likely increase, during the next year with the building up of the new streets now in progress in the new sections of the city.

During the past year nearly all the old wooden posts have been removed and replaced by iron. A few still remain, which must be replaced during the ensuing year.

Considerable work has been accomplished the past season in the way of renewal of old and decayed gas pipes—a work which must be continued, as complaints are continually being made of leakages and consequent danger.

Early in the year a large number of citizens in all sections of the city, and representing large pecuniary interests, petitioned the city for an increase of the volume of light from that produced by the 3-foot gas burners in use, and a restoration of the 4-foot burners which were in use prior to July, 1879.

These petitions were duly considered by the committee, and the officers of the several gas companies held numerous consultations, resulting in the restoration of the 4-foot burners to use in the public lamps.

The gas companies agreed to a very large reduction in the price of gas, as follows:

City proper,	from	$1.75	to	$1.50	per thousand feet.
South Boston,	"	2.25	to	2.00	" "
East Boston	,,	2.25	to	2.00	" "
Roxbury,	"	2.25	to	1.87½	" "
Dorchester,	"	2.75	to	2.25	" "
Brookline,	"	2.50	to	2.25	" "
Brighton,	"	2.50	to	2.25	" "
W. Roxbury,	"	2.75	to	2.25	" "
Charlestown,	"	2.25	to	1.87½	" "

Contracts have been made, under vote of the Board of Alderman, with each of the several companies, for a term of three years, at the above rates.

The following is a copy of the contract as made with the

Boston Gas Light Company, dated April 1, 1880.
South Boston Gas Light Company, dated November 15, 1880.
East Boston Gas Light Company, dated November 15, 1880.
Dorchester Gas Light Company, dated July 15, 1880.
Brookline Gas Light Company, dated June 15, 1880.
Charlestown Gas Light Company, dated April 15, 1880.

This memorandum of agreement, made in the year eighteen hundred and eighty, by and between the city of Boston, of the one part, and the Gas Light Company, a corporation duly established by laws of the Commonwealth of Massachusetts, of the other part; Witnesseth:

I. The said Gas Light Company agrees to furnish all the gas required for lighting the public lamps within that part of the city of Boston now lighted by said Company, on each and every night of the term this contract, as hereinafter agreed, in such manner and between such hours as the Superintendent of Lamps of said city shall direct; to put down service pipes for public lamps in said district where new pipes are required, and to keep in repair the pipes in use in said district, and to use for such new pipes and repairs only wrought iron pipes not less than one inch in diameter, and wrought or malleable iron couplings and bends or elbows, such service pipes to have a regular fall toward the street mains. And said Gas Light Company agrees to furnish automatic regulator burners for all the public lamps in said district, the cost of said burners to be borne equally by said parties, and also to furnish without charge such quantity of alcohol as may be necessary to clear the pipes from obstructions, not to exceed seventy gallons in any one year.

II. The city of Boston agrees to pay to said Gas Light Company, for gas furnished as aforesaid, at the rate of per thousand cubic feet of actual burning, each burner consuming four feet per hour, free from all taxation, and to make payment thereof monthly. Said city also agree to employ and pay lighters to light, clean, and take care of all the public lamps in said district, who shall light and extinguish them punctually, according to printed tables to be furnished by said Superintendent, shall make written returns to said Superintendent and said Company, on Monday of each week, of the number of lamps lighted each night, and the time of beginning to extinguish the same, and shall keep the burners and portions of the pipe above ground, within their respective rounds, free from frost and other obstructions, and give immediate notice to said Company and said Superintendent of any obstructions below ground, and of any leakage of gas. Any neglect of duty by a lamptighter shall be considered sufficient ground for his immediate dismissal. Said city also agrees to repay to said Gas Light Company the actual reasonable expense incurred by them for the labor and materials required for putting down service pipes and keeping the pipes in use in repair, and also to repay to said Company one-half of the cost of the regulator burners and of fitting the same, and also one-half of the actual reasonable expense of removing and cleaning said burners once in each year.

III. It is further agreed that either party hereto, with the consent of the other party, may, from time to time, at its own expense, remove and test any of the burners in use in the public lamps in said district, without interference with the regular burning of said lamps. All new burners shall be tested before being used, such tests to be made in the presence of some representative of each party hereto, and all burners which vary more than one-tenth of a foot from designated standard shall be replaced by said Gas Light Company, the cost thereof to be borne equally by said Company and said City.

IV. It is expressly agreed that the slot of all lava-tipped burners shall be cleaned by the use of a suitable brush, and that no metallic cleaner shall be used upon them, and no lamplighter shall be permitted to open the regulator of any such burner for any purpose whatever.

V. No alteration of the burners in use on the public lamps shall be made without the consent of both parties to this agreement.

VI. This agreement shall take effect on the fifteenth day of current, and shall continue in force until the fifteenth day of eighteen hundred and eighty-three, and thereafter until a new agreement shall be made, or either of said parties shall notify the other of its wish to terminate the same.

Contracts have also been made with the Roxbury Gas Light Company, dated April 15, 1880; and the Jamaica Plain Gas Light Company, dated July 15, 1880, same as the contracts with the other companies, except the insertion of a clause in Section 1, after the words, "and between such hours as the Superintendent of Lamps of said city shall direct," "it being agreed and understood that the hours of burning shall not be less than thirty-eight hundred and twenty-eight per annum for each lamp, and that the number of lamps shall not be less than the number now in use.

The number of lamps in Roxbury at the date of the contract was 1,659, and in Jamaica Plain, 494.

These contracts will expire as follows:

Boston Gas Light Company, April 1, 1883;
South Boston Gas Light Company, November 15, 1883;
East Boston Gas Light Company, November 15, 1883;
Roxbury Gas Light Company, April 15, 1883;
Dorchester Gas Light Company, July 15, 1883;
Brookline Gas Light Company, for Brookline and Brighton, June 15, 1883;
Jamaica Plain Gas Light Company, July 15, 1883;
Charlestown Gas Company, April 15, 1883.

A comparison of prices of gas established for the past six years may not be uninteresting, and is as follows:

	1875.	1876.	1877.	1878.	1879.	1880.
City proper	$2 08½	$2 00	$2 00	$1 90	$1 75	$1 50
South Boston...	2 50	2 50	2 40	2 25	2 25	2 00
East Boston	2 50	2 50	2 40	2 25	2 25	2 00
Roxbury	2 50	2 45	2 40	2 25	2 25	1 87½
Dorchester	3 00	3 00	2 90	2 75	2 75	2 25
Brookline and Brighton....	3 00	2 90	2 90	2 75	2 50	2 25
Jamaica Plain ..	3 00	2 90	2 90	2 75	2 75	2 25
Charlestown	2 50	2 40	2 40	2 25	2 25	1 87½

Frequent applications are made to learn the price charged for gas by the several gas companies to private consumers, and the information is here furnished:

	Private Consumers.	Public Buildings.
Boston Gas Light Company	$2 00	$1 90
South Boston Gas Light Company	2 50	2 50 5 per c. off.
East Boston Gas Light Company	2 50	2 50
Roxbury Gas Light Company	2 50	2 50 5 per c. off.
Dorchester Gas Light Company	3 25	3 00
Brookline Gas Light Co. (in Brighton)	3 00	2 50
Jamaica Plain Gas Light Company	3 00	3 00 5 per c. off.
Charlestown Gas Company	2 50	2 50 5 per c. off.

The public lamps are burned every night throughout the year—a total of 3,828 hours each.

In 1879 the city adopted the Springfield Glycerine Burner, which has continued to give good satisfaction, and to accomplish what is claimed for it by the inventor, viz., to measure accurately the quantity of gas of a certain specific gravity which will pass per hour.

All the gas lanterns made for the city are made of copper, and all made for the past seven years have the Schmedlin & Driscoll patent mode of placing the names of the streets in them, and an arrangement for placing the numbers securely in the lantern, which was the invention of the Superintendent of the department.

This patent method of placing the street signs appears to be the best in use, more especially since the adoption of the acid or sand-blast process of producing the signs on colored glass, which makes the letters durable.

The placing of the numbers in the lanterns is being generally extended over the city, and gives great satisfaction to the public, being a great convenience both by day and night.

The advantage of this style of gas lantern for use in this city will be fully appreciated by the knowledge of the fact that nearly one-half the public lamps stand on the corners or opposite the ends of streets or places, and have the names of the streets and places upon them.

EMPLOYEES.

The number of men employed is 138, as follows:

One superintendent, 1 clerk, 131 lighters, and 5 permanent men in the repair shop.

No deputy superintendents or supernumerary men are employed.

The men (107 in number) who light and clean the gas lamps are paid in the City proper, South Boston, East Boston, and Charlestown 1¾ cents per lamp per night; while in Roxbury, Dorchester, Brookline, Brighton, and West Roxbury they are paid at the rate of $1.60 per day.

The men who light the oil lamps are 24 in number, and are paid at the rate of 3¼ cents per lamp per night.

Nearly all the men who light the oil lamps use horses and wagons with which to perform their duties, for which the city pays no extra compensation.

LAMPLIGHTERS' DUTIES, ETC.

The gas lamps are lighted by the use of the torch.

The duty of these men is to light and put out the lamps in their charge promptly at the time designated; to keep the lanterns clean at all times, and report at this office, in writing, promptly, for immediate repair, every defect either of the lanterns or fixtures; to keep the fixtures properly cleaned and oiled, the burners in perfect order, and the pipes clear from water and frost. In case of gas leaks, they are required to report immediately, in writing, both at this office and to the office of the gas company; they are also required to make a statement, in writing, on each Monday morning, of all the duty performed the previous week.

These men, after performing the duty, have a considerable portion of the time remaining, and are allowed to have other employment, provided it shall not in any way interfere with any duty which may be required of them in this department.

This privilege is very generally used by the employees, and in this way the city is enabled to procure an intelligent and reliable class of men, at a much less cost than it could expect to do otherwise.

All men employed to light both gas and oil lamps are supplied with the necessary ladders, hooks, cans, etc., by the city.

The men employed during the year have been generally prompt and faithful, and cases of discharge for neglect of duty have been very rare.

BROKEN LANTERNS.

The number of lanterns which have been reported by the police as broken the past year was	187
By the lamplighters	6,905
Taken out by repairers without report	837
Total	7,929
Lanterns destroyed	79
Against—	
Broken in 1875	8,268
" 1876	7,444
Broken in 1877	7,527
" 1878	7,587
" 1879	9,757

All repairs of the lanterns are done by the department at its workshop on Albany street.

At this shop there are 5 men permanently employed, and 1 who works at piece-work on the painting of lanterns.

All the cost of men permanently employed, piece-work, repainting lanterns, painting posts and brackets, carting of lanterns, oil, and posts, stock used in repairing, horse-keeping, etc., is included in the item in the schedule for repairing lanterns.

In addition to the lanterns repaired as above, there have been 3,152 lanterns painted two coats, and 3,685 iron posts repainted one coat during the year.

Increase of public lamps in 13 years—

Total increase in 1868	47	Total increase in 1876	1,265
" " 1869	651	" " 1877	289
" " 1870	245	" " 1878	422
" " 1871	266	" " 1879	346
" " 1872	317	" " 1880	249
" " 1873	398		
" " 1874	1,764	Total	7,006
" " 1875	747		

Total number of lamps in use in 1880, 12,664, of which 10,296 are gas lamps and 2,368 are oil lamps.

OIL LAMPS.

The petroleum oil (115 fire test) used for lighting the public lamps where gas is not in use, is purchased of the refiner at the lowest market rate, and has fluctuated in price from 7½ to 11¾ cents per gallon during the past year.

The fonts from which it is burned are of a peculiar shape, adapted to the city use. The "Fireside" B burner is used. These lamps give good satisfaction where they are in use. The cost of maintenance of these lamps has not exceeded $15 each during the past year, including lighting and care, oil, fonts, chimneys, carting, wicking, etc.

PROPERTY OF THE DEPARTMENT.

In addition to the public lamps now located, and tools in the hands of the lighters, the department is possessed of the following property:

Five iron posts for stone sidewalks; 19 bridge posts; 3 iron posts for bridges, with short bases; 2 iron posts for Federal street bridge; 2 iron posts for Common; 154 iron posts as used on the public streets; 817 lanterns; 50 new lantern frames; a small quantity of old iron, and 421 boxes of glass.

Seven horses, 5 wagons, 4 pungs, top buggy, open buggy, sleigh, harnesses, blankets, robes, and the necessary tools for repairing the lamps.

The committee of the department have devoted considerable time to the examination of locations in which additional lamps have been asked for; they have looked with care after the expenditures of the department, and had a general supervision of the purchase of material, which has been procured with the advantage of the largest discounts.

The committee consisted of Aldermen O'Brien, Breck, and Tucker.

There are at the present time over 400 miles of streets and places lighted by this department, covering a more extended territory than any other similar department in the country.

THE FINANCIAL CONDITION OF THE DEPARTMENT.

The balance of the appropriation on hand from 1879, on the 1st of January, 1880, was	$115,214 49
There was expended during the remainder of the financial year	111,972 69
The balance unexpended and transferred to other appropriations was	$3,241 80
The appropriation for the financial year ending on the 30th of April next was	$413,000 00
Amount expended to date	277,379 47
Balance unexpended	$135,620 53

—an amount sufficient to meet all anticipated expenditures of the department for the remainder of the financial year.

The great aggregate cost of supporting this department is to be traced directly to annexation, as one-half of all the street lamps are located within the annexed territory, and more than one-half the appropriation is expended outside the old city limits.

Cost of gas, lighting, and care of present number of lamps—

The 10,296 lamps, burning 4 feet per hour, consume in the 3,828 hours of lighting in a year 157,652,352 cubic feet, or 15,312 feet per lamp per annum.

The average rate which the city pays in all the different districts is $1.80+ per thousand feet for the gas, or $27.69+ per lamp per annum.

The cost of lighting and care of each lamp is $6.36+, making the total cost for gas, lighting, and care of each lamp $34.06+.

The cost for oil lamps was as follows, there being 2,366 lamps, and oil being 11½ cents per gallon:

For each lamp 32 gallons of oil, costing $3.56; cost of lighting and care, $11.40+per lamp; making total cost for oil lamps $14.96+ per annum.

Respectfully submitted,

GEO. H. ALLEN,
Supt. of Lamps.

Gas Matters in Toronto.

In our issue of January 17th we published an account of the controversy on gas matters in Toronto, as it appeared in the Toronto *Mail* of December 14th, 15th, and 17th, which contained references to a report by Mr. Littlehales to a committee of the Council, and a reply by Mr. Pearson to the papers laid before the committee. The report and the reply, together with some additional explanations by Mr. Pearson will be found below.

REPORT OF MR. LITTLEHALES.

HAMILTON, ONT., Nov. 29, 1880.

R. M. RODDY, Esq., City Clerk of Toronto:

Dear Sir—I beg to acknowledge the receipt of yours of the 26th inst., addressed to me as Manager of the Hamilton Gas Works, asking my views on the quality and safety of the gas at present being supplied by the Toronto Gas Company. As this Company and its Directorate do not wish to take part in any question affecting the business of other gas companies, I wish it to be understood that any views herein expressed are simply my own personal opinions as an engineer.

And therefore, to make a *personal* compliance with your request, it may perhaps be well, to enable the Special Committee to fully understand the whole question, for me to give a short outline history of this so-called water gas, which is nearly as old as coal gas, having been before the gas world from time to time for the last fifty years, under ever varying forms in detail, but on the unvarying principle of decomposing steam with red-hot carbon, in the form of charcoal, coke, anthracite, etc.

A Belgian named Jobard was, as far as I can learn, the first to advocate this system, in 1832, and on his idea being made known, Mr. Selligue, of Paris, and also the celebrated George Lowe, one of the fathers of gas lighting in England (who must not be confounded with the inventor of the process known in this country as the "Lowe"), set to work in the same year on a considerable scale in the same line, and from these, five or six others followed in a similar direction. But the idea took no great hold of the mind of the gas world until Mr. Kirkham, one of the leading engineers of London, took the matter up and introduced his method, by which water gas was produced in a generator similar to those now in use, and enriched with the volatile matters of cannel coal. But as the London gas companies would not entertain it, it was introduced to the Paris Gas Company, and was very favorably received, and was about to be adopted when one of the leading chemists of Paris, having made very exhaustive experiments on the poisonous effects of the gas on animals, made known the results, and water gas was no more heard of in Paris for many years. It was subsequently resuscitated for a comparatively short time in England under the name of the "White Process," and more recently, on a similar principle by other parties, under the "Ruck" patents, and bearing the name of the "New Gas."

In 1871 M. Tessie du Motay introduced the system which still bears his name, which is, substantially, the enriching of water gas with the vapors of mineral oil. This was tried, amongst other places, at the Crystal Palace, Sydenham, and abandoned. Subsequently modifications of his former plans were introduced into the United States, and have again given rise to other methods, including the one known as the Lowe process, now in operation in Toronto, which I may here mention is in its most essential and vital point, viz., the decomposition of the steam and hydrocarbons in the same vessel, precisely the same as the old Baldamus and Grune plan, and almost a precise copy of the Kirkham plan. The first works on the Lowe system were started by the inventor, Mr. T. S. C. Lowe, in 1874.

The foregoing brief outline of its history is simply to show you that there is nothing whatever new in the system now being carried on in Toronto, and nothing but what every student of gas engineering has been familiar with for many years past, and the question therefore is perfectly understood.

And now to deal with the two specific points on which you more especially ask my opinion, viz., its quality and safety.

By "quality" I presume you would mean both illuminating power and freedom from the ordinary impurities found in gas; and "safety," as to whether the constituents of the gas itself, when perfected, are of such a nature as to render its use reasonably safe in the hands of the general public.

As to its illuminating power, I am only able to speak from general observations, but I have no hesitation in saying that I have seen greater variations in its quality in Toronto than in any other place in my life. I have frequently seen it when it was very high, and I have also seen it when it was very low. Or, to express it otherwise, I have seen it when, according to my best judgment, it was at least 20 candle power, and again at other times when it was not more than 10 or 11 candle power; and with all due respect and deference to opposite opinions, and notwithstanding positive assertion to the contrary, my knowledge of the principles involved, and of the details of the manufacture, convinces me that it is, from the very nature of the case, next to an impossibility to maintain anything like uniformity in the illuminating power of the gas, which, it must be borne in mind, is one of the greatest desiderata in the supply of artificial light of every kind, as variation in the quality of the gas gives rise to numerous evils and troubles. For instance, it is a well established fact that no gas burner will give satisfactory results with gases of diffent qualities. If a burner be designed and best adapted for, say, a 12 or 14 candle gas, if a higher quality of gas be burned through it, the result will be a smoky flame, causing a waste of gas, and annoyance to consumers in consequence of blackened ceilings, etc.; and if, on the other hand, a comparatively poor gas is consumed through a burner adapted for a gas of a high illuminating power, the result will be an over-oxidation of the flame, and a positive destruction of light, thereby making the poor gas still poorer, by destroying a portion of the light it actually contained; and hence the necessity of a uniformity of quality, as before mentioned.

I wish it to be distinctly understood that I do not for a moment question the perfect accuracy of the tests made from time to time by the Government Inspector; but the apparent conflict between the result of his tests and my own observation can readily be harmonized when it is borne in mind that each photometrical test made by that gentleman would probably not occupy more than half an hour, as a general rule, and it is well known that in this water gas manufacture, notwithstanding all care may have been taken, the quality of the gas may be entirely changed in a very short time; and in case of the slightest inattention it would be changed to a considerable extent. Of course, this evil would not be likely to occur to so great an extent in a large works, where a large number of generators were at work, as in a small place, where a small number where at work.

With reference to the second part of this question of quality, which is more properly one of purity, I am entirely unable to speak, having had no opportunity of making any experiments upon it; but I should reasonably presume that there was no cause of complaint on this point, as the company have ample means to comply with the requirements of the Gas Inspection Act.

Now as to the safety of the gas as at present supplied in Toronto, taking the definition of the term as before given, viz., as to whether the constituents of this gas, when perfected, are of such a nature as to render its use reasonably safe in the hands of the general public. This question is really one to be decided by chemists; but I may say that the result of most careful investigations lead me to the conclusion that it is most certainly not safe. For although, when consumed, the results would be practically the same as from coal gas, yet in case of an escape of gas (and escapes will occur notwithstanding every precaution which can be taken, and all the pains which may be bestowed by the gas company and its officers, and often to a very serious extent) I say most emphatically that in my judgement it is not safe.

I may here mention that I have over and over again predicted, before a single death occurred in Toronto from gas suffocation, that such would be the case; and I here repeat that the longer it is continued the greater will be the number of its victims. And the reason I speak thus strongly is that I feel compelled to do so in the interest of human life, of which, unfortunately, too much has already been sacrificed to water gas, and which should not be weighed in the balance as against 15 or 16 cents per thousand feet, which is all the saving that is yet claimed in the cost of production of water gas as compared with coal gas.

The following statement will show you the constituents of water gas as is usually supplied for illuminating purposes, and also of coal gas, the latter being the analysis of the late Dr. Letheby:

Water Gas.—100 *Parts.*

Hydrogen	23.489	Oxygen	1.021
Marsh gas	24.612	Carbonic acid	.371
Carbonic oxide	27.893		.016
Olefiant gases	17.363		
Nitrogen	5.235	Total	100.000

Coal Gas.—100 *Parts.*

Hydrogen	46.0	Aqueous vapors	2.0
Light carburetted hydrogen	39.5	Oxygen	0.1
Condensible hydrocarbons	3.8	Nitrogen	0.5
Carbonic oxide	7.5		
Carbonic acid	0.6	Total	100.0

It will be seen from the foregoing that water gas contains a very large percentage of carbonic oxide. According to many eminent authorities it contains as much as 33 and 34 per cent., which doubtless it often does.

The following quotations will show the character of carbonic oxide gas:

"It is not a large constituent of coal gas, but it forms a considerable part (about 34 per cent.) of the gas made by the decomposition of steam by red-hot carbon. Like hydrogen, it is colorless and odorless; but unlike it, it is a deadly poison. I have ascertained that two per cent. of it in air will kill birds almost instantly, and, according to Leblanc and Dumas, an atmosphere containing one per cent. of it will kill a small dog in a minute and a half."—Dr. Letheby.

"An atmosphere containing two per cent. of the gas proves fatal to animals breathing it."—Dr. Odling.

"Carbonic oxide is one of the most poisonous gases known."—Bernard Lecons.

"The deadly effects produced by a charcoal fire in an unventilated room are attributed to its action."—Dr. A. W. Williamson, F.R.S.

"Oxide of carbon is not merely passive in not supporting respiration, but it is an active poison, for an animal perishes if left for some time in an atmosphere containing a few per cent. of this gas."—Regnault's Chemistry.

"It is very poisonous when inhaled."—G. F. Rodwell, F.R.A.S., F.C.S.

"It is very poisonous, and even when largely diluted with air, if inhaled, produces tightness of the head, and ultimately acts as a narcotic poison."—Chambers' Encyclopædia.

"The gas occurs in mines along with carbonic acid and carburetted hydrogen. It is very poisonous when inhaled."—Encyclopædia Britannica.

"A rank poison, very exceptionally dangerous as compared with the other constituents of illuminating gas."—Dr. Henry Morton, Professor of the Stevens Institute of Technology, U. S. A.

Many other authorities can be quoted to show the poisonous nature of carbonic oxide gas, of which water gas contains such a large percentage, and were no other testimony quoted than that of Drs. Letheby and Odling, it should be sufficient, being the testimony of the ablest chemists England has ever had. And to show that the foregoing are not "legendary statements of text books, etc.," as is urged by water gas advocates, the following facts are submitted:

In the last two years there have been recorded in the public press of the city of New York no less than 11 deaths from gas suffocation, every one of which was by water gas, which I venture to say is a greater number than can be traced to coal gas in the whole of Europe in the same time. And since water gas has been introduced in Toronto I believe 6 fatal cases have occurred, besides seveal other cases which very nearly proved fatal; and I again venture to say that this is a greater number in Toronto alone than has occurred in the whole of England in the same time, with its hundreds of gas works and hundreds of thousands of gas consumers. I am not aware of a single death having occurred in the whole of Canada (except Toronto) from coal gas for 20 years, and I have made numerous inquiries.

A year or two ago the city of Boston, Mass., appointed a special gas commission, which made a most exhaustive inquiry into all matters connected with the supply of gas to the public, and the result of their report was the adoption by the State Legislature of a law prohibiting the sale of illuminating gas containing more than 10 per cent. of carbonic oxide.

The Yonkers (N. Y.) *Gazette* of October 16 gives the following:

"In the broad silk department of W. H. Copcutt & Co.'s silk factory, Nepperhan avenue, on Friday morning, by the escaping of gas, about fifteen of the employees of that room were prostrated. The morning being cloudy, the gas was lighted, and for some reason was not turned off when the lights were put out. About two hours after this, one of the girls complained of feeling sick, and several others complained of severe pains in the head. The doors and windows were thrown open, and as soon as the fresh air was let in several more fell prostrate, and were carried out of doors, where they partially revived, and those able were assisted to their homes, and others conveyed in carriages. * * * * Daniel Sweeny reached his home and fell prostrate. He will recover. Mrs. M. Kilgour was taken home, and lies in a critical condition. Miss M. Higginbotham walked home and immediately went into convulsions; she is improving. Miss M. Birch was taken home in an insensible condition, and doubts of her recovery are entertained. Others were similarly though not seriously affected."

The foregoing was the result of water gas.

In conclusion, I may say that I have no reason whatever to suppose that the Toronto Gas Company and its officers are not doing all that is possible to be done to supply as good a gas as can be produced by a water gas process; and I have no doubt whatever that every possible exertion is made and care taken to guard against escapes of gas and to satisfy consumers, and to do all that could reasonably be expected of them; in fact, I feel confident that this is so; but I nevertheless feel satisfied that the inherent defects in the system render it impossible for them to permanently satisfy the public with water gas.

I am, sir, yours respectfully,

T. Littlehales.

LETTER FROM MR. PEARSON.

Consumers' Gas Company,
Toronto, Ont., Jan. 25, 1881.

To the Editor of the Am. Gas Light Journal:

Sir—As you have favored your readers, in your last number, with some items from the Toronto *Mail* regarding the gas controversy which has been going on here for some time, you have rendered it necessary for me to make some explanations and statements, without which this Company and myself would be placed in a false position.

As my letter in reply to Alderman Walker and Mr. Littlehales' reports—sent to you at your request—will no doubt be published with this letter and Mr. Littlehales' report in your next issue, I shall confine myself to those points not alluded to in my other letter.

It will, in the first place, be proper for me to state something regarding the causes which led to the appointment of this Committee, a part of whose proceedings you have published, and to give a short history of its procedures not heretofore known to you.

This Committee was appointed through the influence of and on a resolution moved by Ald. Walker in the City Council, ostensibly "to confer" with the Company "regarding the quality of the gas," the alleged reason for this being that a man had been partially suffocated by the gas in the hotel owned by Ald. Walker; and this is the case referred to by him in one of the reports you have published.

At the first meeting of this Committee a letter was read from Mr. Littlehales, manager of the Hamilton Gas Company, addressed to Mr. Wright, proprietor of the Walker House, and son-in-law of Mr. Walker. This letter as published begins as follows: "I observe that Ald. Walker is calling the attention of the Gas Committee and Council to the character of the Toronto gas." and goes on to state that the writer considers that the gas supplied in Toronto should be prohibited by parliamentary enactment; that a number of deaths had taken place in New York and Toronto from water gas; that he sent the information obtained to help Mr. Walker; and it concludes with the delicate intimation quoted by me in the *Mail*, and published in your last issue.

This unsolicited "aid and counsel" strengthened the hands of Ald. Walker, and led to Mr. Littlehales obtaining the call he desired, and did a good deal toward keeping alive an agitation that no doubt would soon have died out.

Although this Committee had been appointed to "confer" with the Company, the only intimation received of its first meeting was a verbal notice given me by Ald. Walker about an hour before it was held. So short a notice allowed no time for preparation and consultation with the President and Directors; consequently the Company was unrepresented. Ald. Walker gave instructions to call a second meeting of the Committee, which through some mistake was not held, again without notifying the Company. In consequence of remonstrances made, he did send proper notice of the meeting held on December 13, reported in your paper. This was the only meeting which the representatives of the Company had an opportunity of attending.

From this and from the reports you have printed, it must be apparent to anyone that Ald. Walker has acted in a high-handed and arbitrary manner, and has shown a strong desire to push through his measures without their being discussed, and without hearing any evidence on the other side. He has in other instances displayed strong hostility to the Company, and treated them with great unfairness, for reasons best known to himself. I cannot, however, help entertaining the conviction that there is a "power behind the throne."

Fortunately, the other members of the Committee are disposed to deal fairly with the Company, and hence the opportunity given to the Company to see the charges made, to enable them to reply to them.

At the meeting of the Committee held December 17, a part of the proceedings of which, as reported in the *Mail*, you have published, it was decided to present an "interim report" to the Council, asking them to apply for Legislation to raise the standard of illluminating power of the gas, and to limit certain impurities therein, and carbonic oxide, in order that the petition might be presented to Parliament within the time limited for receiving petitions. They at the same time reported that they had not com-

pleted their inquiries, and asked for leave to "continue the sittings and investigations, with a view to a final and complete report."

This report was adopted by the Council on December 20, on the above understanding.

The Committee and the Council were evidently misled as to the necessity for presenting the petition to Parliament at once, as petitions were received up to January 15, and this petition was not sent down until a day or two before then, and there was ample time for them to have considered my reply to the report (which was sent in on December 31), and to have completed their inquiries.

As it is, no further meeting of the Committee was called by the Chairman. The old Council have gone out of office; consequently the Committee ceased to exist, and nothing more has been done; and a petition has gone to Parliament on an important matter which neither the old nor new Council have considered.

Since I wrote my letter of December 14, which you have published, I have learned that it was not Mr. Littlehales who furnished Ald. Walker with the information for *his* report, and I very readily make the correction. That I should have supposed he inspired it is not to be wondered at, in view of his letter (read by Ald. Walker three weeks before), to which I have referred, the fact that a report to the Committee had been prepared by Mr. Littlehales, and that there were matters referred to in the Chairman's report which it was very unlikely anyone else here but him could have had any knowledge of.

I did not suppose that Mr. Littlehales *wrote* the report, as it contains arithmetical errors which he would not have made.

In order that your readers may know what value to put upon the statements of the person who either inspired or wrote that report, I give the concluding paragraph of a letter addressed by him to the President of this Company some time since: "It is for you to determine whether I continue in opposition to you or not, or *vice versa*."

As the Chairman's report is answered in my letter to the City Corporation it is unnecessary for me here to reply to it.

And now, regarding Mr. Hague's letter, in respect of which gentleman I may add that for "cacoethes scribendi" he stands pre eminent, never losing an opportunity of airing his opinions on any subject. He takes me to task for stating at the meeting of the gas committee that we had no trouble with the gas in warm weather. The statement I made was in reply to a remark of Alderman Walker's, and had reference to the naphthaline trouble, which did not come upon us until the sudden change of the weather about the middle of September. The paper from which Mr. Hague quoted did not report me fully. A man was sent to Mr. Hague's residence in July and another in August. They changed some of his burners, and reported that the trouble was from their being closed up with a carboniferous deposit. This was the difficulty referred to by me in my paper read at the last meeting of the Association, as having occurred in places at the extreme limits of the mains—and Mr. Hague's residence is so situated.

Both men positively state that they did not at any time remove any tarry substance from the pipes, and that they did not discover any.

One of these men was again sent to Mr. Hague's, on Oct. 5th, and he reported then, and well remembers now, that the trouble then arose from naphthaline in the service pipes, which he blew out, and I cannot find that Mr. Hague made any complaint after this.

Mr. Hague, no doubt, supposed that there was a "viscous, tarry substance" in them, but he was in error; and as the contents of the pipe were blown into the main he could not have seen them. He is also in error in supposing that this took place in August.

And here I would state, after having recently made particular inquiries from all of our men, that the whole of them do not know of more than two instances in which they have found any tarry substance in house or service pipes.

And I would now repeat what I said at the last meeting of the Association that there is much less water and deposit in our drips, and that our mains and services are cleaner than when we made coal gas.

It has been, no doubt, very annoying to Mr. Hague and others to have their gas supply interfered with by naphthaline, and no one has regretted these stoppages more than the officers of the company; but if he knew as much about naphthaline as many who will read this he would not consider it a trouble peculiar to water gas.

As to Mr. Hague's remarks about the illuminating power of the gas, I can only reaffirm what I said regarding it in my paper, and the discussion which followed; and I have no hesitation in saying that the cause of the defect in the light, complained of by Mr. Hague, either arose from the partial stoppage of the pipes by naphthaline, or from defective burners.

Whoever said to him, referring to our gas, "that they tried this dodge in England some time ago, but the public would not stand it" simply knew nothing about it; and, for Mr. Hague's information, I will state that in England gas was never made by the Lowe process.

As to whether or not this company has the right to accumulate a "rest" is a matter which does concern the readers of your JOURNAL.

In disputing this right Mr. Hague is entirely astray, and is just as much so when he intimates that the quality of the gas has been reduced in order to enrich the company.

I should say nothing regarding the report of the proceedings of the special committee of December 17th, were it not that it might be inferred from it that that the company had given up Lowe gas and had gone back to coal.

The fact is that about six weeks before then the company had commenced to use some cannel in their coal gas works, with the hope that it would help to cure the naphthaline troubles.

The manufacture of coal gas would have become necessary soon after, under any circumstances, in consequence of the Lowe works being inadequate to supply all the gas required.

When Alderman Walker spoke of the gas as having improved, *not one-fourth as much cannel was used as when he complained of it the loudest.* It will only be necessary for me to further state upon this point that the test which he obtained from the Government Inspector, and upon which he reported that the gas had been of better illuminating power than before, was one for *sulphuretted hydrogen!*

My other letter answers Alderman Walker's remarks regarding the danger of the gas.

I shall now, in closing, merely add that the officers and directors of this company are still satisfied with the superiority of the new over the old process of gas-making. They have no intention whatever of going back to the latter, and will not do so unless forced by legal enactment, which is very improbable, or unless the prices of material should so change as to make it more profitable to do so, which is also improbable.

That the company should have to pass through difficulties, owing to the introduction of a new process, was only to be expected. One of those experienced has been caused by the higher specific gravity of the gas, which, in many instances, necessitated the use of other burners. Another difficulty has been that which has arisen from those influences which have been at work, already referred to, and which have resulted in creating an unwarranted prejudice against the gas on the part of many, and have caused them to attribute almost any trouble with their gas to the introduction of the process.

Other difficulties have been experienced, which would doubtless have taken place in any case, owing to the peculiarity of the past season, such as the naphthaline troubles which have prevailed here and elsewhere, caused, no doubt, by the sudden change from warm to cold weather early in the fall, and the freezing of many of the services, caused by the extremely cold weather coming on, and continuing, long before the snow fell.

The naphthaline troubles, though not cured by the use of cannel coal, happily passed away weeks ago.

The frost may, as in years past, still give some trouble, but it is found that the less coal gas made, the less difficulty there is from this source; and believing in the superiority of the gas, I have no doubt it will "live down" the prejudice which has been raised against it.

Respectfully, yours,
W. H. PEARSON.

A LETTER TO THE CORPORATION OF THE CITY OF TORONTO, ON THE GAS SUPPLY, FROM W. H. PEARSON.

CONSUMERS' GAS COMPANY,
TORONTO, December 28th, 1880.

ROBT. RODDY, Esq., *City Clerk, Toronto.*

SIR—I beg to acknowledge the receipt of your letter of the 20th inst., with a communication from Mr. Littlehales, and a draft of a "report" prepared by the Chairman of the Special Committee appointed to confer with this company regarding the quality of the gas, sent to me for the purpose of my replying thereto.

As most of the matters referred to are considered both in Mr. Littlehales' letter and the "report," instead of replying to each separately I shall answer them collectively, mentioning, however, as occasion may require, when I reply to a statement contained in one which is not in the other.

In Mr. Littlehales' introductory remarks, giving a short history of water gas, he states that it has been before the gas world for a number of years, "under ever-varying forms, but on the unvarying principle of decomposing steam with red hot carbon."

With this statement I have no disposition to find fault. Nor do I dispute his statement that efforts made to introduce water gas in England failed.

That this should have been the case is not to be wondered at. Few inventions of any importance have been successfully introduced without at first meeting with failure, and it is often only after other men have improved upon the original ideas of inventors that success is accomplished. Coal gas was quite as long in winning its way into public favor as water gas has

been. Many improvements were made in the various apparatus required for its manufacture, and many obstacles and much opposition and prejudice had to be overcome before it was generally adopted. As an instance of this I saw the other day a copy of a petition from a large number of influential inhabitants of the city of Philadelphia, dated 1830, setting forth a great number of evils and calamities that would inevitably follow its introduction there, owing to its poisonous, explosive and destructive nature, and praying the Government to prohibit it. They evidently for a long time succeeded, as that city was not lighted with gas until five years afterwards.

A brief statement, showing the slow rate of progress coal gas made for a long time, may not be here out of place.

The first proposals to light a town with coal gas were made in England as early as 1765. It was not practically applied for lighting until 1792, when William Murdoch lighted his own house with it in Redruth, Cornwall. It was not introduced into London, until 1807, when a private individual lighted Pall Mall with it, and a gas company was not formed there until 1810. Paris was not lighted with gas until 1820, New York until 1834, and Philadelphia until 1835.

The idea of lighting by electricity was entertained over 30 years ago, and attempts were then made to introduce it, but it is only recently that to any extent this idea has been practically carried out.

Apart, however, from any other consideration, there were powerful economic reasons, such as the high price of anthracite coal and oil, to prevent the successful introduction of water gas in England, and on this account it is doubtful if it will ever make much headway there.

Whatever want of success it may have met with in England, water gas is making rapid progress in America—about sixty companies having adopted it within about five years, four of them being in Canada, whilst a number of new works are contracted for or are in course of construction.

One of the processes referred to as having failed in England—the Tessie du Motay—was introduced, with modifications and improvements, in New York, about five years ago, and has been in successful operation ever since. About four years since, in consequence of the great demand for their gas, the company working the process erected new works capable of producing three million cubic feet per diem. Other works have since been erected elsewhere, and are working successfully.

The Lowe process, which Mr. Littlehales says is almost a precise copy of Kirkham's plan, differs from it in some material points, as can be easily shown, and is a great improvement upon it.

In both the "report" and Mr. Littlehales' letter exception is taken to the gas supplied by this company, principally upon two grounds, namely, its *quality* and *safety*.

The question of the quality of the gas is almost altogether taken up by Mr. Littlehales.

In discussing this, he very properly refers both to its illuminating power and freedom from ordinary impurities found in gas. As exception is not taken to it upon the latter ground, either by Mr. Littlehales or in the chairman's "report," it may only be necessary for me to state that the Government tests invariably show, that since gas has been supplied here by the Lowe process alone, the amount of impurities found therein *has never in any case exceeded the legal standard*, while, according to the published reports, *it has frequently been exceeded by all the coal gas companies in the Dominion*, where tests had been made for any length of time. In a great many instances these impurities have been found *very largely in excess*, and in the case of one large company, on several occasions *as much as fifty times over the allowance*. Indeed, two large companies have not during some years complied with the Act as far as one of the impurities is concerned, and one of these companies has almost invariably exceeded the standard with regard to the other. Had Mr. Littlehales desired to do so, he could as easily have tested the gas here for two impurities, as have observed its illuminating power.

With reference to the illuminating power of the gas, he speaks from *general personal observations alone*, and from these he condemns the gas, and says that he has seen "greater variation in its quality" here than in "any other place;" that he has seen it when, according to his "best judgment, it was at least twenty candles," and "at other times when it was not more than ten or eleven." He also says: "My knowledge of the principles involved and of the details of the manufacture, convince me that it is, from the very nature of the case, next thing to an impossibility to maintain anything like uniformity in the illuminating power of the gas."

Knowing very well that the frequent tests made here by the Government Inspector showed no such variations as he states, and knowing that he could not ignore those tests, Mr. Littlehales attempts to explain the discrepancy between them and his "observations" by stating that, as a rule, the tests did not occupy more than half an hour.

Let us now consider whether Mr. Littlehales' occasional "observations" or the Government tests are the most reliable, and whether his assertion is a correct one. In doing this I shall have to refer to a matter which Mr. Littlehales' disparagement of the gas renders it necessary for me to speak of in order to show his unreliability and apparent determination to misrepresent facts. (See Appendix A.)

In the tests made here—72 in number—taken at different periods between February 1st and September 30th last, when we were making water gas exclusively, only a difference of 2.75 candles was shown between the highest and lowest of the whole record, and no Government tests made since then show any greater difference. The correctness of the Government tests is confirmed by the tests made three times a day at least by this Company, which have not shown in a long time a variation of 2 candles. Surely, if there was any such variation as is claimed, it would have manifested itself during some of the tests spread over so long a period. I assert, notwithstanding Mr. Littlehales' knowledge of "the principles involved and the details of manufacture," that it *is* quite possible to maintain a very uniform quality of illuminating power with water gas, and that the tests made here show this. In further proof thereof I give the testimony of three managers of Lowe process works; and others could be given if necessary. (See Appendix B.)

Let us see what the record says of the coal gas made at Mr. Littlehales' works in Hamilton. In the Government report for the year ending June 30, 1879, the last that I have received, I find that 49 tests were made of Hamilton gas, the highest illuminating power shown being 17.20, and the lowest 12.96, a difference of 4.24 candles. Taking Mr. Littlehales on his own ground, that the tests fail to show truly the variation in illumination, how great then must have been the variation in the coal gas in Hamilton, the photometer itself showing, with the comparatively few tests made, over 50 per cent. more than Toronto! Nor do the records of the previous year say anything more in favor of the gas made there; in this respect, indeed, the difference is greater. In fact, quite as great a difference is shown in the gas made by all the coal gas companies in the Dominion. In further proof of the incorrectness of Mr. Littlehales' conclusions, it will only be necessary for me to say that the records of 1878 show a variation in the gas made by the St. John, N. B., Company of from 19.79 to 10.24 candles, or a difference of 9.55 candles; and great variations are shown in three of the eight months in which the tests were taken.

The statement is made in the report that the manager of this Company acknowledges the imperfections of the gas by advertising to change the burners free of expense. In doing this no such acknowledgement was made; the object, as stated, was merely in some instances to supply burners suitable to the somewhat higher gravity of the gas, in others to replace worn-out burners. The objection to lava burners was solely on account of their liability in some localities to close up by carbonization, as they had done in other places where Lowe gas is supplied, owing to the richness of the gas, and probably to the fact of the hydrogen being less in quantity than in coal gas; and Mr. Littlehales informed me that the same difficulty occurred with some of his lava burners at Cobourg, of the works of which he is the lessee. The statement that the Company are asking consumers to use 5-feet burners instead of 3-feet is unwarranted. The object of the Company in supplying burners to consumers free of charge is solely for the convenience of the latter.

The charge of the gas being of poor illuminating power is proved to be unwarranted by the tests made by the Government Inspector and by the Company, the former of which show an average for 8 months, ending Sept. 30th last, of 15.91 candles, which is higher than the best average of that of the coal gas previously supplied, and higher than the average shown in any of the reports of that of the neighboring city of Hamilton.

Objection has been made that, although the gas as tested by a bar photometer may show a higher illuminating power than that of coal gas, yet after all it does not have the same radiating power. In answer to a question as to whether or not both gases tested in this manner had the same radiating power, the celebrated gas analyst and chemist, Dr. H, Wurtz, says: "A person acquainted with this process and appreciating the principle it is founded upon, could no more hesitate to answer the question in the affirmative than he could hesitate in agreeing to the truth of the mathamatical axiom that 'things which are equal to the same thing are equal to one another.' The notion which I am told is propagated among your consumers, of some peculiar want of illuminating power in the gas, can be nothing but sheer fantasy."

Whenever any defect has been noticed in the gas it must therefore have been local, and have been caused either by some stoppage in the pipes or defects in the burners.

If anything more were needed to prove this, we have it in the written testimony of a number of the largest consumers, who speak strongly of their satisfaction with gas generally.

The statement that the present gas carries with it tar or other heavy substances, which necessitates the blowing out of the pipes, etc., is incorrect, the fact being that there is much less tarry deposit and condensation in the pipes from this gas than coal gas. The stoppages complained of have been

caused by the deposition of naphthaline, which it is well-known is a very old and serious trouble with coal gas works, and is not peculiar to water gas; and in the past, when making coal gas, this company has had relatively greater difficulty from this cause than it has had recently.

This difficulty has been completely overcome, and I am satisfied no more stoppages need be apprehended. Naphthaline is not an impurity.

And now as to the charge of the *danger* incurred from the use of the gas.

This charge is made upon the ground of there being a large amount of carbonic oxide in the gas, and in corroboration of this claim it is asserted that more accidents result from its use than from coal gas, which contains a smaller amount of carbonic oxide. Mr. Littlehales very properly says that this question "is really one to be decided by chemists," and a number of authorities are quoted, both by him and in the "report," testifying to the dangerous nature of carbonic oxide, but not one is quoted in condemnation of what is called water gas.

But I would submit that the question is not whether or not carbonic oxide is a poisonous and dangerous gas, but whether the so-called water gas, containing say 22 per ct. of carbonic oxide, and less of other deleterious gases is on the whole more dangerous than coal gas containing say 7 per cent. of carbonic oxide, and a larger proportion of other deleterious gases; and in estimating the relatively injurious nature of these gases, two elements of danger must be taken into consideration—their poisonous and suffocating character and their explosiveness; and hitherto more accidents have taken place from the latter than from the former.

As it is stated in the "report" that water gas was prohibited in Paris because of its dangerons character, I give, in addition to explanations given for its not having been adopted there by Professor Adolphe Wurtz in Appendix C., the following one by Gideon Moore, Ph.D., of Jersey City, New Jersey:

"The objections to water gas in general on account of its contents in carbonic oxide, are based on an entire misconception of the meaning of the reports of the eminent scientific men who were called to pronounce upon its safety in France." The French report was unfavorable for the following reasons:

"The gas was not saturated with illuminating hydrocarbons, and was consequently inodorous; it was not of itself luminous, but was employed to heat to whiteness small cages of platinum, which were suspended in the flame, and furnished the luminous body. Being inodorous, the escape of the gas could not have been detected, hence the dangers arising from accidental leakage were excessive."

I shall now give a few quotations from the opinions of some chemists of eminence—and of others, who, although not so noted, are possessed of very high qualifications—regarding the safety of water gas. (See Appendix C.)

It may be proper to remark, that the analyses of water gas given both in Mr. Littlehales' letter and the "report," are not analyses of the gas made by the Lowe Process, but of that made by another one, which contains a larger amount of carboric oxide than what has been found in the gas made here by the former process, which has averaged about 21 per cent. The analyses of coal gas given are about the usual averages; as the carbonic oxide and other gases present usually vary, according to circumstances, as they do in water gas; and carbonic oxide may be present in coal gas to as great an extent as 12 per cent., or even higher.

It is worthy of note that Mr. Littlehales, in his analyses of coal gas, has called the "marsh gas" (the destructive fire-damp of coal mines) by another of its appellations, "light carburetted hydrogen," while in the analyses of the water gas he calls it "marsh gas."

As the dangerous character of the gas is further attempted to be shown by the number of deaths which it is claimed have taken place in New York and here from its use, it will be well for me to consider the accuracy of the statements made, and the correctness of the deductions drawn therefrom.

Mr. Littlehales says:

"In the last two years there have been recorded in the public press of the city of New York no less than eleven deaths from suffocation, every one of which was caused by water gas, and which I venture to say is a greater number than can be traced to coal gas in the whole of Europe in the same time." Of course he means it to be understood that these deaths took place in New York. With reference to the reported deaths in New York, I would say that I got a friend there to make particular inquiries as to the correctness of this statement, and the following is his reply—

"The following I get from the 'Coroner's Office,' and by inquiry at the places where the deaths occurred:

"There have been eleven deaths from illuminating gas in the city of New York in the past two years.

"Three of which were caused by explosions at gas works.

"Three were suicides, by the persons deliberately stopping key-holes in door and putting rugs at bottom of same, and closing fan-light, unscrewing gas bracket. Neither of these should be mentioned, I think, in yours or any other report.

"Three by accidental suffocation with 'water gas.'

"Two by accidental suffocation with 'coal gas.'"

Whether the three deaths from suicide were from water or coal gas is not stated, but it would be manifestly unfair to blame either for them, and such a quantity of gas was allowed to escape as would be far more than sufficient with either gas to cause death.*

This leaves three cases of suffocation which can be properly charged to water gas, and three from explosions, the kind of gas which caused them not being stated. Now, suppose we allow Mr. Littlehales these cases for the sake of argument, and include in the list of deaths in Great Britain during the time referred to, those which took place from a similar cause, and see how far this claim is borne out.

In venturing to say there were a greater number than could be traced to coal gas in the whole of Europe in the same time, Mr. Littlehales ventures a statement that it would be somewhat difficult to controvert, as far as the Continent of Europe is concerned, owing to lack of information on the point. As far as Great Britain alone is concerned, I find the following accidents recorded in the *Journal of Gas Lighting* as having resulted from coal gas. How many took place that are not recorded it is hard to say:

1878—Explosions, 14; deaths 1; fatal suffocations, 11.
1879—Explosions, 20; deaths, 4; fatal suffocations, 6.
1880, to Dec. 7th—Explosions, 6; deaths 2; fatal suffocations, including two from carbonic acid gas, 5.
Total—Explosions, 40; deaths, 7, fatal suffocations, 22.

Besides the deaths from explosions, a number of persons were seriously injured.

In estimating the relative danger of the two gases, as I before said, the danger from explosions must be taken into consideration.

It will thus be seen that Mr. Littlehales has again shown some want of accuracy in his statements, and he is perhaps not aware that in making such an assertion he is paying a high tribute to the safety of gas containing very much more carbonic oxide than that made in Toronto; as, according to Dr. Wurtz, wood gas, containing from 27 to 32 per cent. of carbonic oxide, is used largely in many European cities. The gas made from lignite or brown coal, in Berlin, contains 40 per cent., and, according to Prof. Chandler, in Johnson's Encyclopedia, the wood gas of the city of Munich, Bavaria, contains 40.5 per cent. of carbonic oxide.

Mr. Littlehales says further:

"Since water gas has been introduced in Toronto, I believe six fatal cases have occurred." Here again, as usual, Mr. Littlehales is wrong. Four cases, it is supposed, have taken place, but one of those I dispute—that of a feeble woman who arrived at a hotel late at night, apparently very ill and almost utterly exhausted, and who after being in a room for about six hours, where the gas was found escaping from a small burner, was found lying on the floor not only dead but cold. No particular examination took place, and no Coroner's inquest was held. Her friends from the country, who came for her body, expressed no surprise at her death. The other three cases all apparently resulted from carelessness, either from blowing out the gas or leaving it turned on. Two of these persons inhaled the gas for many hours and yet lived some days afterwards; and a relative of one of them said that he had been previously insane, which would make it harder for him to recover from the effects of the gas. It is worthy of remark that none of the deaths recorded as having taken place in Great Britain resulted from the carelessness on the part of the parties who suffered; and it is evident that so much ignorance regarding the use of the gas does not prevail there as here. Mr. Littlehales has again shown a want of knowledge of facts, in asserting that more deaths took place in Toronto than in England since water gas was in use here, as seven deaths from suffocation and six from explosions are recorded in the *Journal of Gas Lighting* as having taken place during that time; besides two others from carbonic acid gas in the ammonia works of a gas company. The terrible explosion in the Tottenham Court Road, London, England, last July, damaging to a greater or less extent over 400 houses, causing great destruction of property, injuring more or less over 30 persons, and causing the death of two others, will be fresh in the memory of every one.

The number of deaths which have taken place here since the introduction of water gas in Jaunary, 1879, has given color to the charge, that water gas is more dangerous than coal gas; but a reference to the past may tend to disabuse the minds of any who may hold that opinion. It is certainly a fact that accidents of a similar character do often occur very soon after each other, and then again for a long period none occur whatever.

The past history of this company fully bears this out. Late in 1853, a man was suffocated at the works. Early in 1857 a house was completely

* Since this was written I have received information of two more deaths having taken place in New York from coal gas.—W. H. P.

demolished and all of the inmates more or less injured from an explosion by the gas having entered the cellar through a sewer. About the same time, two girls were suffocated in a hotel from an escape from a burner. In 1860 a young lady was suffocated from gas escaping into a house through a sewer, and two other persons were asphyxiated at the same time, and recovered with great difficulty. In 1861, a woman was found dead in a room in the morning, from the effects of gas escaping from a burner during the night.

Here there were five deaths from suffocation in Toronto in less than eight years, two occurring in one year, and two more within two years, besides another serious accident.

Taking into consideration the difference in the amount of the consumption, which averaged during these years only about one fifth of what it has been here recently, relatively a much larger number of deaths from coal gas suffocation took place then, than since this company commenced making water gas.

The number of accidents which have taken place within a very short time recently from gas escaping from coal stoves is another illustration in point.

Experience here has not proved that water gas causes death more rapidly than coal gas. While in some of the above mentioned cases, the parties were found dead in the morning from the escape of coal gas from an ordinary burner during the night, persons have recovered here after inhaling the water gas for a much longer period—one after having inhaled it thirteen and a-half hours, and another after inhaling it eighteen hours; all the apertures in both of the rooms being closed up tight, and in the latter case the room being a very small one.

It remains to be seen whether or not Mr. Littlehales' predictions will be verified; but if his prophecies are not more correct than his statements of fact, there is not much danger of them being fulfilled; and it is worthy of note that Mr. Littlehales did not commence to prophesy until after the accidents had taken place. In October, 1879, in a discussion on a paper read by me on water gas, in which he took considerable part, he never once referred to the danger connected with its use; but on the contrary, in alluding to its commercial advantages, said, "It is the most important consideration in the whole thing." I may also add as a significant fact, that at the two meetings of the American Gas Light Association, at which this subject was discussed, out of the considerably over one hundred gas managers, engineers, etc., present, only two persons besides Mr. Littlehales referred to its poisonous nature—one to ask some questions regarding it, and the other to claim that it was not more dangerous than coal gas.

In conversation with a number of gas engineers after the last meeting, every one of them said that the question was simply and purely a commercial one.

Although the matter is not referred to either by Mr. Littlehales or in the "report," yet as it has gained currency that water gas is specially dangerous because of its high gravity, it may be as well to say that such an idea is perfectly groundless. The gas made here is not much more than half the weight of air, very little heavier than good coal gas, not nearly so heavy as many kinds of cannel coal gas, and it is impossible to have gas of high illuminating power without its being of high gravity. The gas will raise a baloon, and anyone who will open a gas jet in the lower flat of a house will very soon find that the gas will ascend to the upper ones.

The fact of a law having been passed recently in Massachusetts which practically prohibits water gas is presented as an argument why a similar law should be passed here. I am informed on credible authority that that law was passed in the interests of coal gas companies. Coal gas companies naturally do not want competition, and most coal gas managers do not care to have the trouble of making the changes necessitated by the introduction of a new process. Moreover, many of them have already committed themselves against water gas, and it would be considered "coming down" in having to acknowledge their mistake by adopting it. The easiest way to get rid of the difficulty and shut out opposition, of course, would be to obtain legislation against it, and I am quite satisfied that coal gas companies in other places would be very glad to obtain the same legislation. The legislation obtained has given plenty of margin to coal gas companies, but has limited the only dangerous ingredient in the gas, which is found in water gar to a greater extent than in coal gas. If it is so very dangerous, why not legislate it all out, and why not obtain legislation limiting the quantity of the dangerous marsh gas, of which there is a very large quantity in the coal gas? Simply because coal gas companies could not comply with such conditions.

The law passed in New Jersey, referred to, practically prohibits the manufacture and sale of illuminating gas, as it enacts that no gas can be sold which contains more than 2 per cent. of carbonic oxide or 10 per cent. of hydrogen. Any one who understands the composition of gas, must be aware that no illuminating gas can be made to comply with those conditions. The fact that there are a number of gas companies in this State, none of which do or can comply with the Act, is sufficient evidence that the law is a dead letter.

This company is blamed for not substituting five feet burners for those used in the street lamps.

The company will be very glad to do so if the Corporation will pay the difference for the gas. I am quite confident, however, that on testing the burners it will be found that instead of consuming three feet per hour—the quantity contracted for—they are on the average consuming considerably more. I would take the liberty of reminding the committee of some other facts connected with the street lamps, which are worthy of consideration. The company have recently erected over 500 iron posts, at a cost of several thousand dollars, and on the principal streets are putting on handsome globes at a very considerable cost. I think I may also say that there is not a place on the Continent where the lamps are kept in a better or cleaner condition.

While speaking of the street lamps, it may also be as well for me to correct an opinion which is apparently entertained by some of the members of the Council, viz., that the city is paying more for the gas than private consumers are. A member of your Committee is reported in the papers to have said that the company, though reducing their rate to private consumers, continued to charge the city at the rate of $3.00 per thousand feet for the gas supplied to the street lamps, while ordinary consumers got it for $2.00 per thousand. The fact is, ordinary consumers only pay $1.50 to $1.75 per thousand; and after paying for the expense of lighting, cleaning and repairing, and interest on outlay for the street lamps, the company do not receive from the Corporation more for the gas than the lowest price mentioned, and the Corporation was only paying at that rate, when the citizens were paying $2.50 per thousand.

It may now be well for me to repeat what I said in a circular addressed to the members of the Corporation; that the limitation of the carbonic oxide in the gas now supplied by this Company and several others in the Dominion to the quantity allowed by the Massachusetts Legislation, would be tantamount to its prohibition; for no means has yet been discovered for its profitable elimination. "It would cause a loss to the Company of the large amount expended for the erection of works for the purpose. It would render it necessary for them to increase the price of the gas without being able to supply as good an article as that now furnished. It would stop the expenditure in our own Province by this Company alone of from $25,000 to $30,000 annually for petroleum, and cause them to spend in the United States instead between $50,0000 and $60,000 for coal to take the place of petroleum."

It is stated in the "report" sent that as "the consumers were not consulted about the expense incurred in changing the mode of manufacture," therefore the gas company should pay for their own experiments themselves.

In reply to this I beg to say that this new process was introduced after the most careful investigation principally in the interests of gas consumers, and mainly as a result of its introduction the price of the gas was reduced 25 cents per thousand feet, and had not this process been introduced, no reduction would have been made. Now, this being the case, should the Company be forced to return to the manufacture of coal gas, no one would have the right to blame them for returning to the old prices, especially with coal so much higher than it was before the price was lowered. There is no doubt that the consumers would be much dissatisfied at this, but the responsibility of making the change would not rest upon the Company, but upon those who might force them to take such a course.

All of which is respectfully submitted,

W. H. Pearson, *Secretary.*

Appendix A.

At the meeting of the American Gas Light Association last October, at Chicago, in a discussion upon a paper read by me there on the Lowe process, Mr. Littlehales made a similar charge regarding the gas, but first took care to furnish himself with a statement, which he read for the purpose of showing that its illuminating power was sometimes as low as that which he then claimed it had been—under 10 candles. This statement I disputed, and then the following discussion, as recorded in the American Gas Light Journal of the 16th inst., took place:

"Mr. Littlehales—Mr. Pearson challenges my statement about the quality of the gas. I read a paragraph from a Toronto paper: 'Alderman Boustead presented four reports by the Government Inspector in reference to the gas supplied to the city by the Toronto Gas Company. They showed the illuminating power of the gas (12 candles being the standard) to have been on October 5, 12.08 candles; on October 9th, 10.62; on October 28, 14.67; on October 11, 11.54.'

"Mr. Pearson—That is manifestly incorrect.

"Mr. Littlehales—This was last October.

"Mr. Pearson—We were making coal gas then, gentlemen.

"Mr. Littlehales—Last October?

"Mr. Pearson—We were unable to use the Lowe process exclusively, because we had not the means of properly purifying the gas. That is a very different statement. (Laughter.)"

Will it be believed, that the paragraph which Mr. Littlehales read was taken from a Toronto paper, not of October, 1879, but of November, 1876, and contained a report of the illuminating power of the gas made by this Company in October of the same year—years before this Company commenced making gas by the Lowe process?

In corroboration of this, it is only necessary to call the Committee's attention to what they are probably aware of—that Alderman Boustead, who presented these reports, has not been a member of the City Council since 1878, and was not Chairman of the Fire, Water, and Gas Committee after 1876.

APPENDIX B.

Mr. John Kerr, manager of the Kingston Gas Works, where the Lowe process has been in successful operation for about four years, writes me as follows in a letter dated the 20th inst.:—"I do not find any difficulty in maintaining our gas at a uniform standard, nor need there be any, if the same quality and quantity of oil is used, and the same degree of heat maintained in the generator and superheater. During the past month my gas has not varied more than 2 candles in any one day, and very seldom that; and I feel perfectly satisfied that this much and even more variation will take place in any coal gas works in a given space of time."

Mr. Kerr was manager of a coal gas works for about 30 years.

Mr. F. H. Hambleton, the engineer of the large Lowe Works of the Consolidated Gas Company of Baltimore, Md., in connection with which there are two coal gas works, writes as follows under date of the 24th inst.: "I have to say that we are not troubled about our candle power, and that the city inspector reports us as making a variation from the average of less than one candle for months; in fact, ever since we started.

"We are satisfied, and have fewer complaints by long odds from our consumers of oil gas than from those using coal gas."

The manager of the Lancaster, Pa., works writes:

"The candle power is not variable after it leaves the holder, as I have frequently tested. We take the candle power at the works, and from tests at my house, one and a quarter miles distant, there is no perceptible difference. I am now running, besides our works, the coal gas works of the old company, and with the best skill I cannot prevent the gas from varying, and will abandon gas making at these works soon after January next, and make all by the Lowe process."

APPENDIX C.

Dr. E. Frankland, of the Royal College of Chemistry, of the South Kensington Museum, London, writes, regarding the water gas manufactured by the Municipal Gas Light Company of New York:—"In compliance with your request, I have read the reports of Dr. Henry Wurtz, dated January 1, 1878, and March 4, 1878, on the composition and properties of the gas of the Municipal Gas Light Company of New York, and also the articles published by Prof. H. Morton, in the AMERICAN GAS LIGHT JOURNAL of March 2 and 16, 1878, and having been called on to express my opinion as to the adaptability of this gas for lighting and heating purposes, I have no hesitation in saying that it may be used with safety both in public buildings and private houses. I should be delighted to substitute this *pure and powerful illuminating agent* for the gas with which my house in London is at present supplied, although it is used in all the bedrooms."

Dr. Adolphe Wurtz, member of the Institute, Professor at the School of Medicine and the School of Sciences, Paris, writes regarding the same gas:

"I have been struck with the correctness of the remarks which terminate the report of Dr. H. Wurtz, and which in my opinion answers the objections formulated by Dr. Henry Morton, inserted in two articles in the AMERICAN GAS LIGHT JOURNAL, published in New York. No doubt the danger of poisoning exists with all gases containing carbonic oxide, and coal gas is not exempt from the latter, as it can contain as much as 12 per cent. of its volume. But I think the danger—which could only have sad consequences in exceptional cases and through a sort of fatality—has been exaggerated, and should not be taken into account, considering that gas is used without hesitation for lighting our houses, notwithstanding the very real danger of explosion and fire, no matter what kind of gas and its composition.

"Further, the use of water gas has never been prohibited in France; and if the numerous processes which have been indicated for its production have been abandoned, or have received only a restricted application, the cause is principally due to the circumstance that the technical and economical conditions of the production have, up to the present time, been very unfavorable.

In reply to inquiries made by me regarding the relative danger of coal and water gas, Prof. T. Sterry Hunt, of Montreal, writes:

"I must say, however, that the notion of any important difference as to the safety or fitness for use of two such gases seems to me to be absurd. The only questions to be raised are the relative cheapness and illuminating power."

The following are answers to questions addressed to Dr. Henry Wurtz, of New York, regarding the Lowe gas:

"*Question* 5.—Are the products of combustion of this gas, when in use, more or less deleterious to health than those of gas from gas coal?

"The answer to this question must be qualified by assuming it to apply to gases of *like candle powers*. In this case it is matter of chemical demonstration that the amount of carbonic acid formed by the Lowe gas when burning, the amount of aqueous vapor formed, and the amount of atmospheric oxygen consumed or destroyed, are all three very considerably less than in the case of gas from gas coal. The effects upon the atmospheres of rooms (equally lighted with the two gases) tell, therefore, considerably in favor of the Lowe gas.

"*Question* 6.—Whether, in the event of leakage in dwellings, the new gas is more dangerous or less dangerous to life and property than ordinary gascoal gas?

"The dangers from leakage of gas are two in kind: 1. From suffocation by inhalation. 2. From explosion and fire. Of these, the last is much the most common and the most serious, involving injury to both property and life. Indeed, suffocation rarely, or almost never arises from ordinary (accidental) leakage; but mostly from inexcusably culpable negligence or ignorance. Facts on record support strongly the belief that variation in composition of illuminating gases has little or no appreciable influence in its suffocating quality. The most narcotic agents present are the illuminating hydrocarbons, and a small percentage of these in air is always dangerous to life, by reason of the rapid anæsthesia which follows their inhalation; and carbonic oxide is also a powerful anæsthetic, but not more so than these heavy hydrocarbons, on which the illuminating value of all gases depends. As to the explosiveness of the two gases, however, and the danger arising therefrom, the new gas has a decided advantage."

"Carbonic oxide is a gas whose explosive power for equal volumes is far smaller than that of marsh gas, a main constituent of ordinary gas coal gas. This is because in exploding marsh gas consumes four times as much oxygen as carbonic oxide. The introduction of the Lowe gas must therefore be attended with diminution of risks to life and property.

(Signed), HENRY WURTZ, Ph.D.

12 HUDSON TERRACE,
HOBOKEN, May 13, 1878.

Regarding Dr. Henry Wurtz, Professor T. Sterry Hunt, of Montreal, writes:

"He has for many years past paid special attention to the various questions connected with gases for illumination and heating, and has by original processes much improved the method of gas analyses. I do not hesitate to say that his ability and his conscientiousness would make his judgment in all cases where such cases are involved of the greatest weight."

The following are extracts from a report prepared at the request of this company, by Professor H. H. Croft, late Professor of Chemistry, University College, Toronto:

"The explosions caused by gas arise from its becoming mixed with oxygen, or what comes to the same thing, atmospheric air, containing one-fifth of oxygen.

"Olefiant gas, with 3 parts of oxygen (15 of air), forms a fearfully explosive mixture.

"Marsh gas, with 2 parts of oxygen (10 of air), forms an equally explosive mixture.

"Hydrogen, with one-half its bulk of oxygen (2½ air), forms a strongly explosive mixture.

"Carbonic oxide, with oxygen or air, forms a mixture which, as far as I know, does not produce any violent explosion.

"Hence, the greater the quantity of these hydrocarbons, olefiant and marsh gas in the gas, the more explosive it would probably be when mixed with air.

"In conclusion, I may say that the gas made by the Lowe process, or from coal, may be used indifferently, with proper precautions and common sense, and that the one is not on the whole more dangerous than the other nor nearly so much so as the oil employed in our lamps."

The following is an extract from a report on the gas, made for this Company by Dr. Pike, Professor of Chemistry, University College, Toronto.

"The city gas as at present supplied is, if used with ordinary precautions necessary in the case of coal gas, free from all practical danger, which is, as

far as I remember, what Prof. Croft says in the report which I saw. I find it more difficult than I anticipated to come to a certain conclusion as to the comparative danger to life of an open tap or leak in a bed room in the case of coal gas and Lowe gas, but I think that the following considerations will prove to you that there can be no great difference."

Some years since, Prof. H. Morton, of the Stevens Institute, Hoboken, N. J., objected to the gas because of its dangerous character, and he is the only chemist of note in America, that I am aware of, who has done so; but even he has changed his views upon the point, and in a letter to the *Sanitary Engineer* of Jan. 15th, 1880, says—

"I am quite ready to admit that when the subject first came to my notice my impression was very much of that nature;" that is to say, "that water gas was so practically dangerous (on account of the large amount of carbonic oxide in it), that it should not be admitted into general use;" "but further consideration modified this view," and that "it would be a question of economy and efficiency simply whether water gas did or did not become the gas of the future."

It is worthy of note that Professor Morton, in an article upon carbonic oxide, in the AMERICAN GAS LIGHT JOURNAL, of March 2d, 1878, quotes many more authorities than those mentioned by Mr. Littlehales, and in the "report," in proof of its poisonous nature.

Gas Explosion at Yonkers.

THREE MEN WHO WERE IN THE GAS HOUSE UNINJURED—THE BUILDING DEMOLISHED.

Shortly after eight o'clock on Monday evening, February 7th, the residents of Yonkers were startled by a loud report and a vibration of the earth accompanied in many instances by a crashing of crockery and chinaware on tables and in cupboards that forcibly suggested an earthquake or a realization of Mother Shipton's prophecy. The report was heard and the vibration felt by persons living five miles away. Those who happened to be in the vicinity of the Westchester Gaslight Company's works saw a bright, thin flame of hardly a second's duration shoot like a cannon flash from the roof of the gas house in Nepperhan avenue.

Before the explosion occurred three men were in the building, a two-story brick structure, about 20 feet wide and 50 feet long, with a sheet iron roof, and walls twelve inches thick. These men were William Pierson, the gas maker, Andrew Hanson, the engineer, and Jerry Johnson, the watchman. The building is divided into five rooms. The largest of these contains the gas generating apparatus. Connecting with this room are three smaller ones, the wash room, the station metre room, and the room where the candle power of the gas is tested. Adjoining these is the purifying room. After the gas is made it passes from the generating room into boxes in the purifying room through an apparatus called the centre seal. It is said that a valve connected with the bottom of the centre seal, which should have been closed, was partly open, and filled the purifying room with gas. The twelve inch wall separating the purifying room from the wash room is full of crevices. There was a light burning in the wash room, and when Wm. Pierson, the gas maker, opened the door to go in and wash his hands, the explosion occurred.

The wall fronting on Nepperhan avenue was demolished. The heavy sheet iron roof was lifted several feet, and fell amid the ruins. The only walls remaining intact are those enclosing the wash room and the back wall. The gas maker was stunned by the explosion. The watchman and the engineer were standing together near the back door of the generating room, and were blown through the door against a stone wall, about 15 feet away. They were uninjured. None of the gas generating apparatus was damaged. The damage to the building will not exceed $1,500. The explosion will not interfere with the supply of gas to the city. The Westchester Company will have the damage repaired within a week.—New York *Sun*, Feb. 9.

One Man's Decided Opinion about the Gas Explosion.

To the Editor of the *Sun*—Sir: You speak of the explosion in East Eighty-first street as a "Mysterious Gas Explosion," and in your report of it say: "Persons who smelled the gas in the cellars declared it came from the Knickerbocker Company's mains," and "that their gas was not made from coal."

This explosion, if investigated, will, in my opinion, wake up the Legislature to the necessity of fixing restrictions upon the use of naphtha, gasoline, and kindred products obtained by distillation from petroleum. They insist by legislative enactment that kerosene shall be deprived of these explosive substances to such a degree that it will stand a fire test of 112°; yet they allow these light hydrocarbon liquids to be used anywhere and by every one for all purposes without restriction. A few days ago we had the tenement-house fire and consequent loss of life from this unbridled license. A short time before this we had the meter explosion, which, I think, killed two men. A year or two ago there was an explosion of a street gas main from the same cause.

All these so-called mysterious accidents came, I believe, from the same cause, viz., using so-called gas made from these hydrocarbon liquids for illuminating purposes. By every known process, a portion of those liquids brought and kept in contact with heated surfaces is converted into a so-called fixed gas, and the remainder is converted into a hydrocarbon vapor, similar to that made by forcing air across the surface of the liquid at its ordinary temperature.

This vapor is heavier than air, and condenses at a degree of heat less than it was manufactured at, consequently it will leak from the gas pipes and lie like water in any depression. Should it be set in motion by a current of air, or find no outlet through the air at a point lower than its surface level, it at once forms an explosive mixture far more dangerous than gunpowder.

These hydrocarbon vapors are carried along mechanically by the fixed gas, but where the fixed gas by reason of its volatile nature escapes through the air and consequently seldom does any damage, these vapors are collected in any tightly walled-in space, where they remain till they are put in motion and brought in contact with fire. They can be lighted readily by the glowing coal on the end of an ordinary lucifer match after the flame has been extinguished. It is probable that the exceptionally good masonry made the two caverns under the front stoop two fine cisterns that were filled to some outlet level with this vapor, only waiting for a spark to produce a mysterious explosions.

The remedy is to place a prohibitory tax on the sale of these dangerous fluids and prohibit their use for making illuminating gas.

J. FRANK HOXSEY.

—New York *Sun*.

House Drainage in Chicago.

Some time ago the executive committee of the Citizens Association of Chicago appointed a sub-committee to consider the subject of house drainage. That committee consisted of Fred. Baumann, J. R. Willett and B. Lathrop. After considerable investigation and prolonged deliberation the committee has embodied its ideas in a report, of which the following is a brief summary of the recommendations made—

1. Concrete the ground under the entire building.
2. Ventilate the main sewers by a perforated cover on every manhole.
3. Every house to have a cast iron soil pipe, not less than four inches in diameter, running from sewer to roof, without a trap, accessible for inspection throughout its entire length.
4. Every sink, wash basin, bath tub and water closet (except the "trapless" closets) to be trapped.
5. Every trap to be ventilated from its highest point into a pipe running out above the roof, and disconnected from the soil pipe.
6. Joints in iron pipes to be leaded and caulked to rust joints. Joints between iron and lead pipes to be made with tinned iron or brass ferules, soldered.
7. Catch-basins to be built outside of the house wherever possible, and ventilated by a special pipe.
8. Water closets to connect with the outer air by a window or light-shaft, and to have a ventilating flue.
9. Avoid pan closets, and use hopper or improved closets.
10. On the upper floor each water-closet to be flushed from a separate tank through a pipe not less than 1¼ inch in diameter.—*Van Nostrand's.*

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Letter from Mr. Littlehales.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Sir—An apology is due from me to Mr. Pearson on account of an error into which I fell, in stating at our Chicago meeting that the clipping which I read from a Toronto paper was of the date of "October last." This was not so; *but from a paper issued while they were making coal gas.* The clipping was handed to me as being of the date to which I referred; but the mistake was, I am sure, quite unintentional on my own part, and on that of the gentleman from whom I received it. But while admitting my mistake in this particular, I do not in any respect withdraw a single statement I made in reference to gas matters in Toronto. In fact, the very admission by Mr. Pearson that such a state of things existed there when making coal gas, proves conclusively that gas matters in Toronto were, to put it mildly, not quite up to such a standard as an engineer could reasonably feel proud of, and that any change in any direction could hardly fail to be for the better, as it would seem difficult for it to have been worse.

Yours respectfully,

T. LITTLEHALES.

GAS WORKS, HAMILTON, ONT., Jan. 28, 1881.

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

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WEDNESDAY, FEB. 16, 1881.

Official Report of Examinations of Gas for two Weeks ending Feb. 12, 1881, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

1881. Jan.	Time of Day at which Test were made.	New York Gas Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
		†	*	†	‡	*	†
31		24.18	19.69	25.03	23.63	19.76	28.28
Feb. 1	Between	25.45	19.21	25.68	23.37	19.47	30.76
2	9.30 A.M.	25.49	19.28	25.62	23.06	18.76	30.49
3	and	24.55	19.56	24.18	22.79	18.91	30.28
4	1 P. M.	24.21	19.33	25.09	22.71	18 56	28.43
5		24.36	19.43	24.96	22.82	17.78	29.26
	Average	24.70	19.41	25.09	23.06	18.87	29.58
7		23.43	18.84	24.85	23.68	19.15	29.00
8		25 62	19.34	24.37	24.05	19.32	31.84
9		25.27	19.41	24.54	24.28	20.11	30.56
10		25.64	19.47	27.72	24.44	19.65	30.00
11		26.23	19.36	25.62	24.32	19.41	30.22
12		25.74	19.91	27.26	23.87	18.90	30.55
	Average	25.32	19.39	25 72	24.10	19.42	30.36

* Five foot lava tip with check.
† Bray's slit union, No. 7.
‡ Bray's slit union, No. 6.

E. G. LOVE, Gas Examiner.

The Covering of Pulleys.

The importance of covering the face of pulleys with leather is realized by but few persons having charge of machinery. Full 50 per cent. more work can be done without the belts slipping if the faces of the pulleys are so covered. Leather belts used with the grain side to the pulley will not only do more work but will last longer than if used with the flesh side to the pulley. This is owing to the fact that the grain side is more compact and fixed than the flesh side, and more of its surface is brought in contact with the pulley. The smoother the two surfaces, the less air will pass between the belts and the pulleys. The more uneven the surface of the belt and pulley, the more strain is necessary to prevent the belt slipping; for what is lost by want of contact must be made up by extra strain on the belt. Leather belts, with the grain side to the pulley, can, it is said, drive 34 per cent. more than the flesh side.—*Ironmonger.*

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W B Scott & Co.,)
34 PINE STREET, NEW YORK CITY.
FEBRUARY 16, 1881.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid.	Asked
Gas Co.'s of N. Y. City.				
Central	$466,000	50	60	65
Harlem	1,800,000	50	62½	65
" Bonds	170,000			103
Manhattan	4,000,000	50	178	182
Metropolitan	2,500,000	100	135	140x
" Scrip	1,000,000	..	102	103x
Mutual	5,000,000	100	60	65
" Bonds, gold	900,000	1000	100	104
Municipal	1,500,000	100	150	160
" Bonds	750,000		106	110
New York	4,000,000	100	98	100
Northern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	108	112
Citizens	1,200,000	20	45	50
" S. F. Bonds.	320,000	1000	100	105
Fulton Municipal	1,500,000	100	54	58
Peoples	1,000,000	10	20	25
" Bonds.	290,000	...	90	95
" Scrip	250,000	...	75	85
Metropolitan	1,000,000	100	50	55
Nassau	1,000,000	25	45	48
" Ctfs.	700,000	1000	95	100
Williamsburgh	1,000,000	50	60	64
" Bonds		...	98	103
Kings Co	135,000	100	55	60
" Bonds	40,000	—	—	—
Richmond Co., S. I.	300,000	...	70	75
Out of Town Gas Companies.				
Buffalo Mutual, N.Y	750,000	100	72	76
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	85	90
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			70	71
Bonds			107	—
East Boston, Mass		25	114	120
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	140	144
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150.000	40	117½	
Jersey City	750,000	20	140	150
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	—	100
Laclede St Louis Mo.	1,200,000	100	108	110
Montréal, Canada	2,000,000	100	148	149
New Haven, Conn		25	132	—
Oakland, Cal			33	34
Peoples, Jersey City		...	85	90
" " Bds.				5
Pittsfield, Mass			120	130
Rochester, N. Y		50	70	80
" Citizens		100	30	35
Rondout & Kingston			75	80
St. Louis Missouri	600 000	50	250	254
San Francisco Gas-Co., S. Fr'isco Cal.			75	76
Toledo, Ohio			95	97
Troy, Citizens	600,000	100	—	—
Washington, D. C	1,500,000	20	215	225
" Scrip	500,000	20	150	160
Woonsocket, R. I.	150,000	100	80	...
Wilmington, Del.		50	174	...
Yonkers		50	—	70

The following shares were sold at auction: 20 shares Manhattan, @ 180; 10 shares Mutual, @ 64; 96 shares Brooklyn, @ 110; 48 shares Nassau, @ 45; 3 shares Metropolitan, @ 135½; $60 Metropolitan scrip, @ 101¾.

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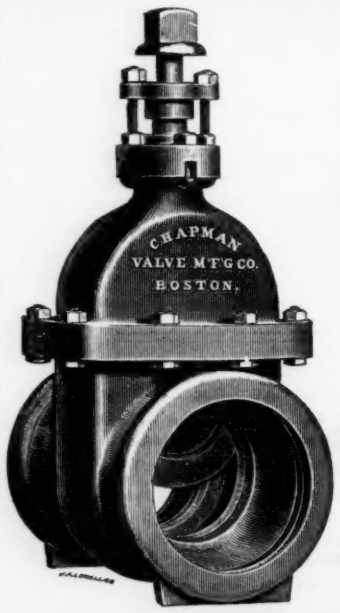

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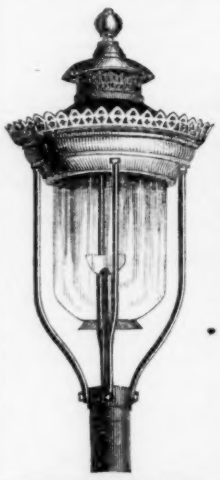

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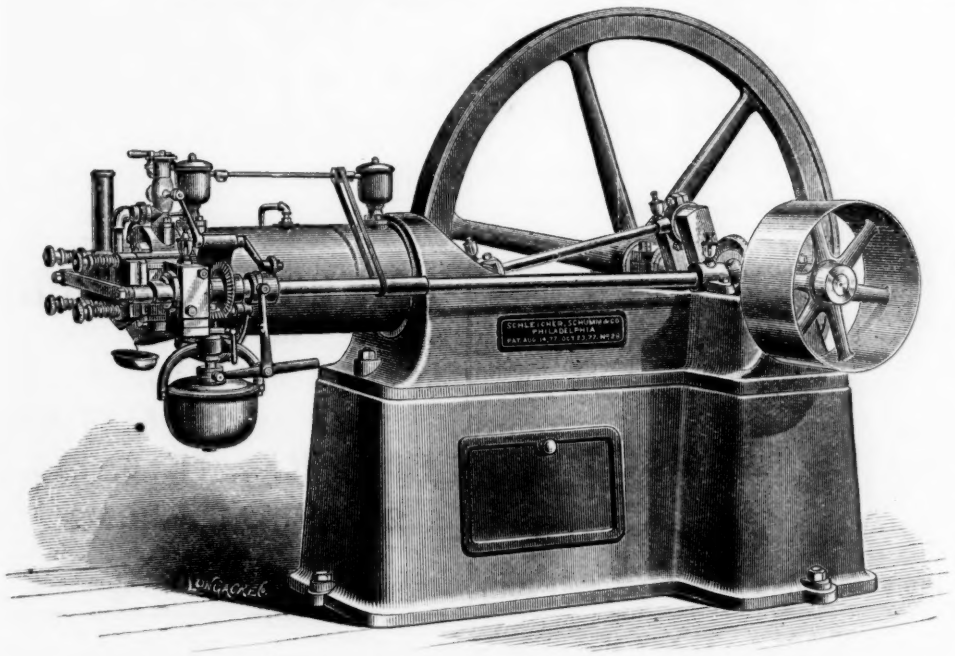

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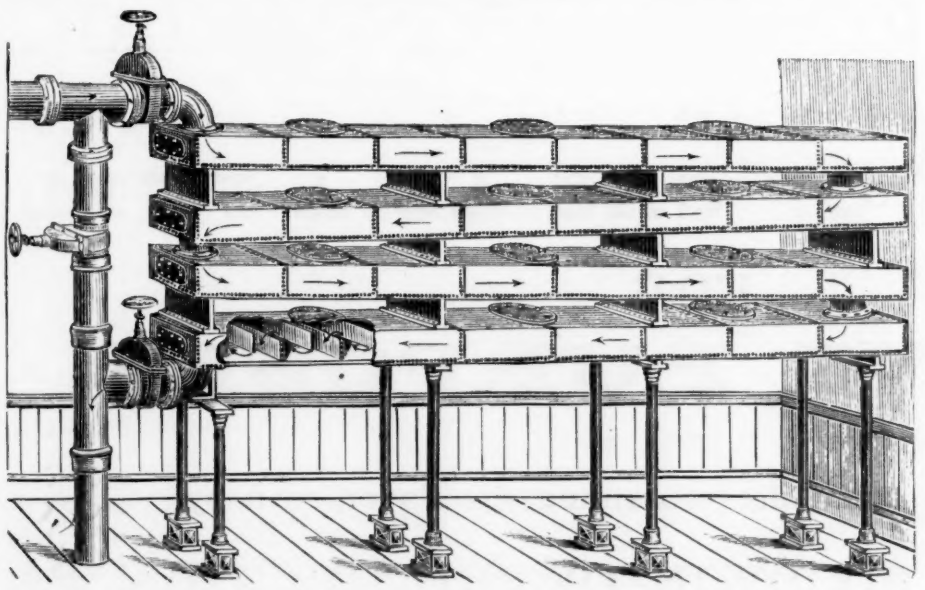

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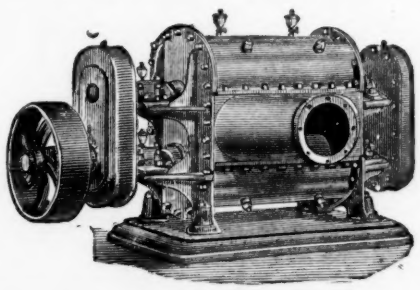

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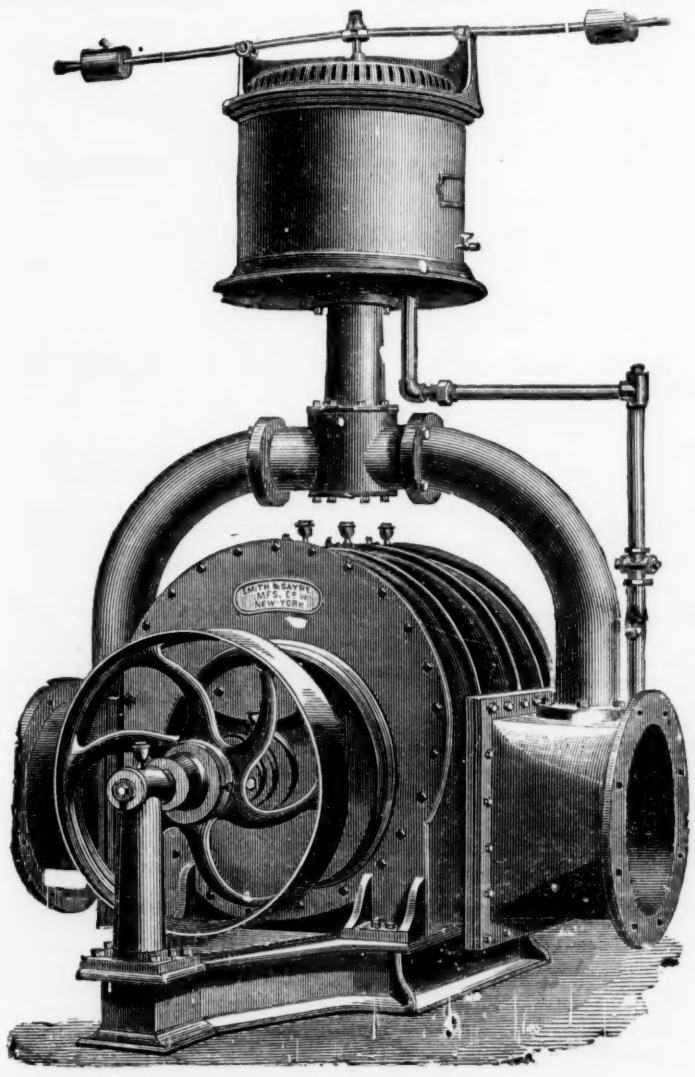

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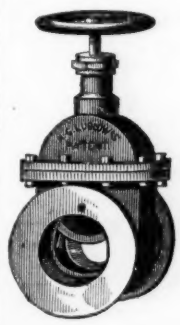

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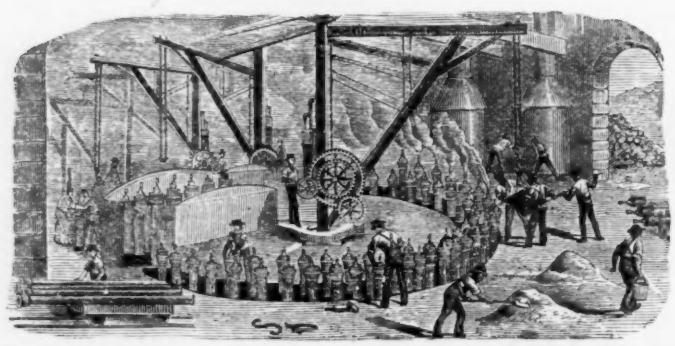

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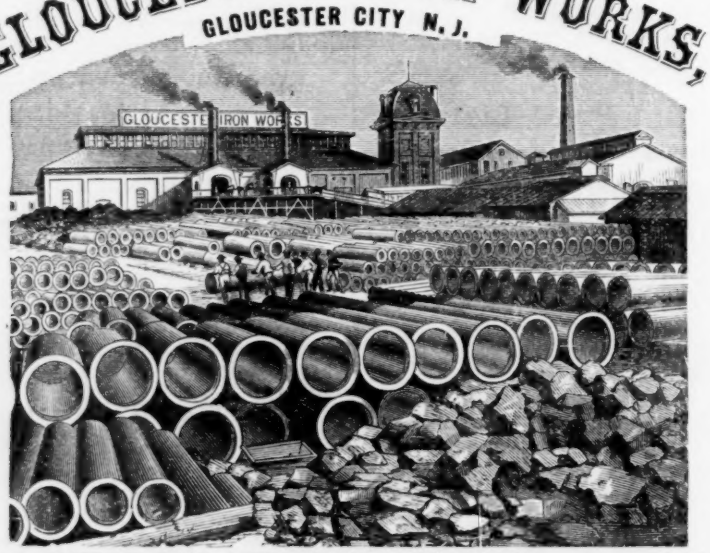

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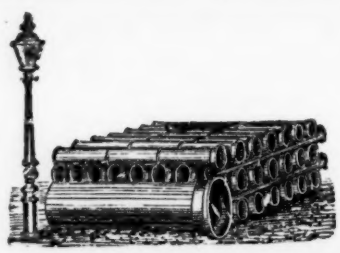

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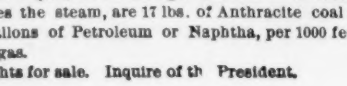

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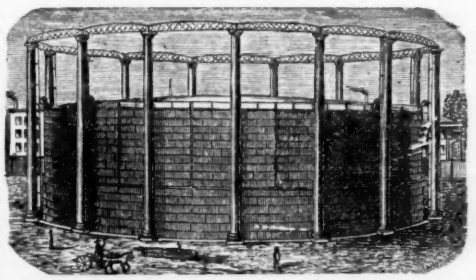

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C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

Best dry coals shipped from Locust Point, wharves, and prompt attention given to orders for chartering of vessels.

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OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.
Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.
BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 15 German St., }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine

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COAL, CAREFULLY SCREENED,

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FROM THE BRITISH PROVINCES.

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12th and Brown Sts., Philadelphia, and 49 Dey St., N. Y., U. S, A.,

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The Exhibit consists of a Series of METERS from the Largest Size Station Meters for the use of the MANUFACTURE OF GAS, to those for the use of he ORDINARY CONSUMER. The Instruments are WELL MADE, RELIABLE as to INDICATION, and embody a number of sundry improvements which, with the general character of the Exhibit, entitle the whole to commendation.

Attest—J. L. CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R. HAWLEY, President

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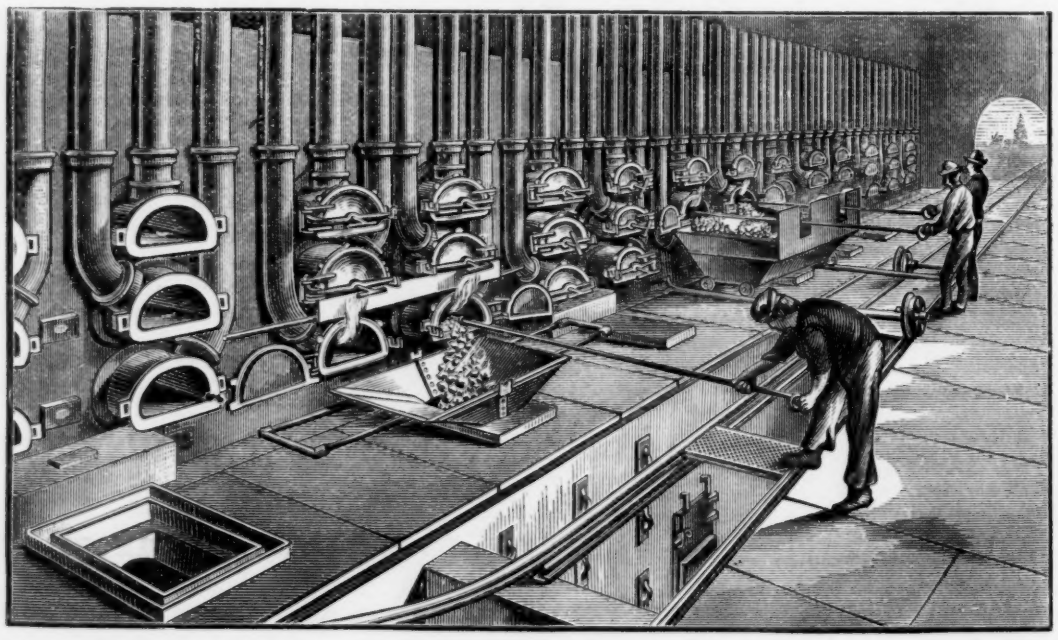

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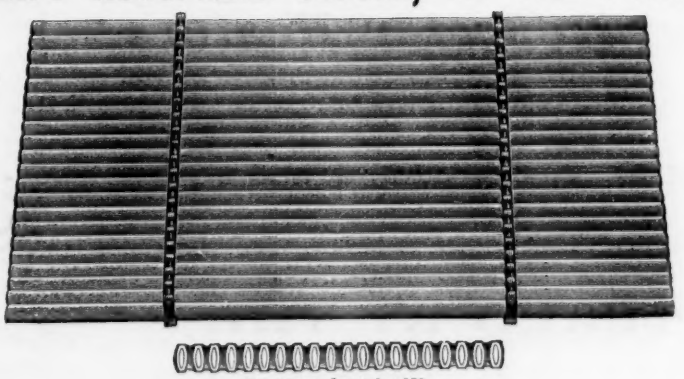

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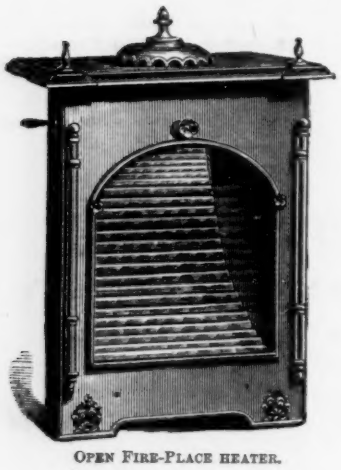

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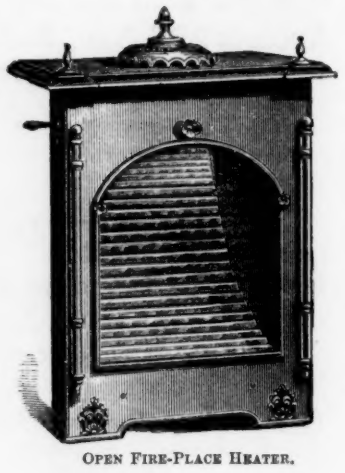

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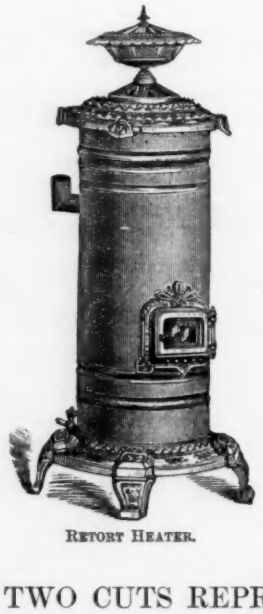

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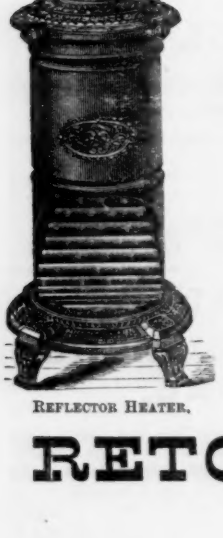

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